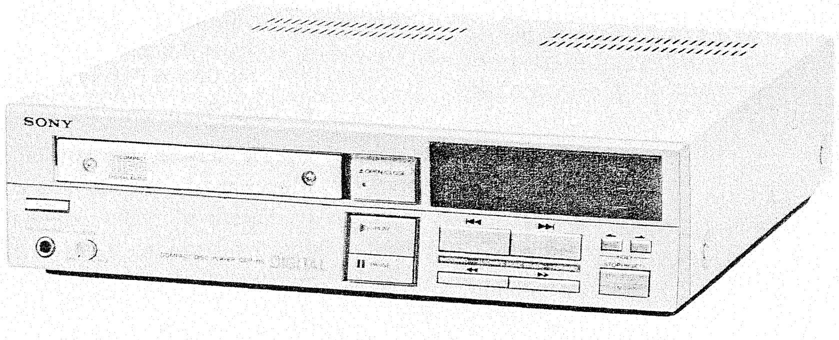
CDP-11S

SERVICE MANUAL

AEP Model
UK Model
E Model



COMPACT
disc
DIGITAL AUDIO

SPECIFICATIONS

System:	Compact disc digital audio system
Disc:	Compact disc
Laser:	Semiconductor Laser (λ = 780 nm)
Spindle Speed:	200 r.p.m. to 500 r.p.m. (CLV)
Scan Velocity:	1.2 – 1.4 m/sec.
Error Correction:	Sony Super Strategy Cross Interleave Read Solomon Code
Number of Channels:	2
D-A Conversion:	16-bit linear
Frequency Response:	5 – 20,000 Hz $^{+0.5}_{-1.0}$ dB
Harmonic Distortion:	Less than 0.004% (1 kHz)
Dynamic Range:	More than 90 dB
Wow and Flutter:	Below Measurable Limit
Outputs:	Line outputs Output level 2 V rms (MSB) Load impedance over 10 kilohms Headphones 28 mW at 32 ohms

Disc

Track Pitch:	1.6μm
Sampling Frequency:	44.1 kHz
Quantization:	16-bit linear quantizing/channel
Modulation System:	EFM
Transfer Rate:	2.3 M bit/sec. (before modulation)

General

Power Requirements:	AEP Model: 220 V ac, 50/60 Hz UK Model: 240 V ac, 50/60 Hz E Model: 110, 120, 220 or 240 V ac, adjustable, 50/60 Hz
Power Consumption:	24 watts
Dimensions:	Approx. 355 x 95 x 340 mm (w/h/d) (14 x 3 3/4 x 13 1/2 in.)
Weight:	Approx. 6.6 kg (14 lb 9 oz)

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY SHADING AND MARK ⚠ ON THE SCHEMATIC DIAGRAMS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

MICROFILM

COMPACT DISC PLAYER

SONY®

AUD

PROTECTION OF EYES FROM LASER BEAM DURING SERVICING

This set employs a laser. Therefore, be sure to follow carefully the instructions below when servicing.

WARNING !!

WHEN SERVICING, DO NOT APPROACH THE LASER EXIT WITH THE EYE TOO CLOSELY. IN CASE IT IS NECESSARY TO CONFIRM LASER BEAM EMISSION, BE SURE TO OBSERVE FROM A DISTANCE OF MORE THAN 30 cm FROM THE SURFACE OF THE OBJECTIVE LENS ON THE OPTICAL PICK-UP BLOCK.

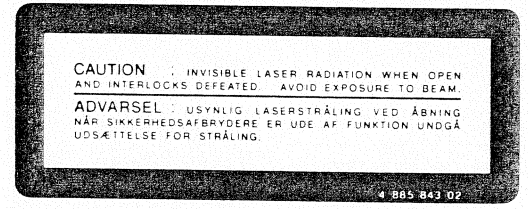
1. Laser Diode Properties
   - Material: GaAs
   - Wavelength: 780 nm
   - Emission Duration: continuous
   - Laser Output: max. 0.4 mW*

     * This output is the value measured at a distance of about 1.6 mm from the objective lens surface on the Optical Pick-up Block.
   - Classification: Class IIIb
2. During service, do not take the Optical Pick-up Block apart, and do not adjust the APC circuit. If there is a breakdown in the APC circuit (including laser diode), replace the entire Optical Pick-up Block (including APC board).

LASER WARNING LABELS

The labels shown below are affixed.

1. Caution Label . . . . . (AEP model only)

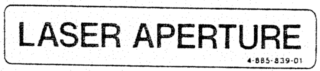


CAUTION : INVISIBLE LASER RADIATION WHEN OPEN AND INTERLOCKS DEFEATED. AVOID EXPOSURE TO BEAM.

ADVARSEL : USYNLIG LASERSTRÅLING VED ÅBNING NÅR SIKKERHEDSAFBRYDERE ER UDE AF FUNKTION. UNDGÅ UDSÆTTELSE FOR STRÅLING.

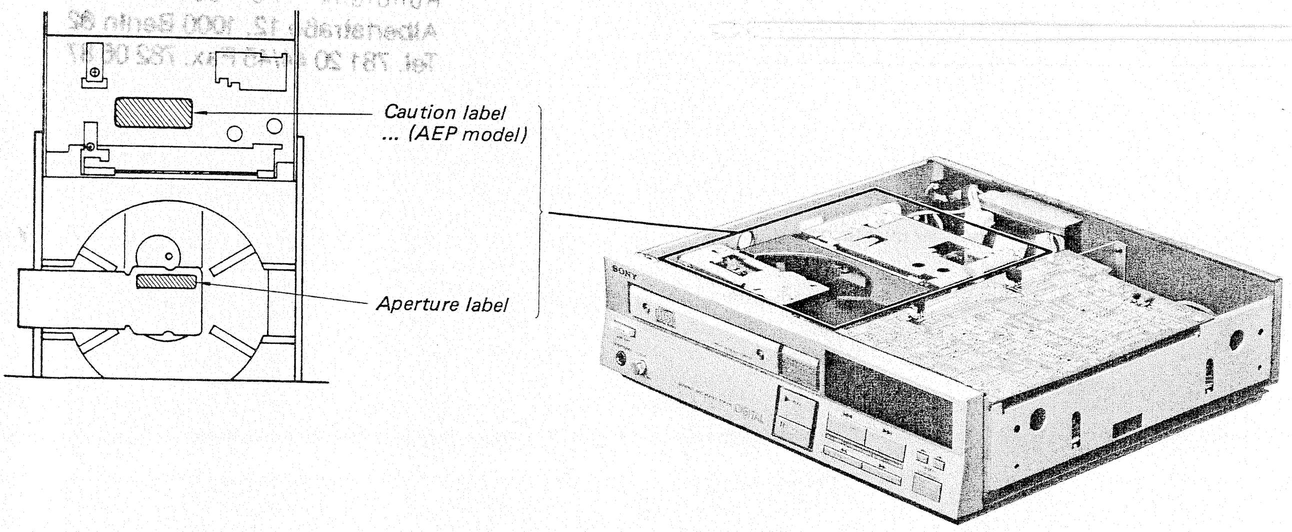
4-885-843-02

2. Aperture Label . . . . . (AEP, UK model only)



LASER APERTURE

4-885-839-01



BESKYTTELSE AF ØJNE MOD LASERSTRÅLING UNDER SERVICE

I dette apparat anvendes laserlys. Derfor skal nedenstående instruktioner nøje følges under service.

Følg iøvrigt instruktionerne i servicemanualen.

ADVARSEL!!

Under service må øjnene ikke komme nær objektiv-linsen på den optiske pick-up enhed. I tilfælde af at det er nødvendigt at kontrollere udsendelsen af laserlys, skal det ske i en afstand af mere end 30 cm fra den optiske pick-up.

1. Data for Laser Diode
   - Materiale: Ga-As
   - Bølgelængde: 780 nm
   - Udstråling: Kontinuerlig
   - Laser Output: max. 0.4 mW*

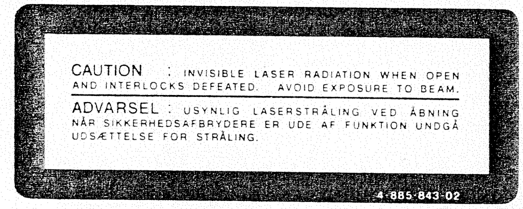
     * målt i 1.6 mm afstand fra overfladen af objektiv-linsen på den optiske pick-up enhsd.
   - Klassifikation: Svarende til klasse IIIb

2. Adskil aldrig den optiske pick-up enhed under service, og juster ikke APC kredsløbet (Automatic Power Control). Hvis APC kredsløbet (incl. laser-dioden) bryder ned, skal hele den optiske pick-up enhed (incl. APC printkortet) udskiftes.

LASER ADVARSEL MÆRKNING (AEP model)

Følgende mærkning findes indvendig i apparatet:

1. Advarsel Mærkning

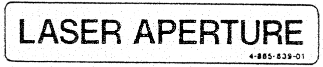


CAUTION : INVISIBLE LASER RADIATION WHEN OPEN AND INTERLOCKS DEFEATED. AVOID EXPOSURE TO BEAM.

ADVARSEL : USYNLIG LASERSTRÅLING VED ÅBNING NÅR SIKKERHEDSAFBRYDERE ER UDE AF FUNKTION UNDGÅ UDSÆTTELSE FOR STRÅLING.

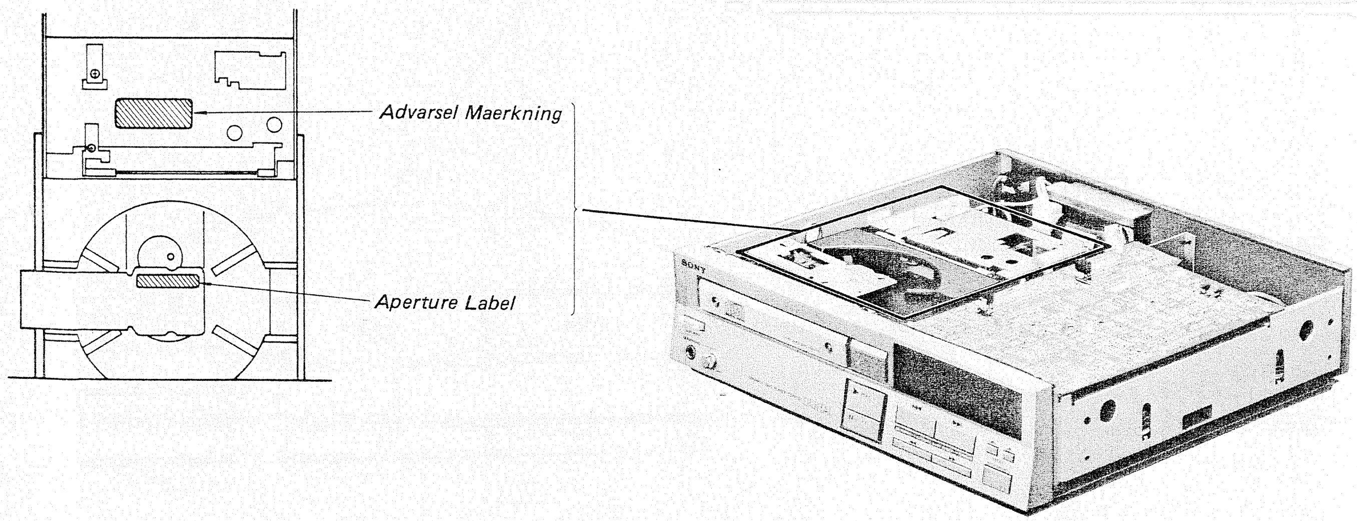
4-885-843-02

2. Aperture Label



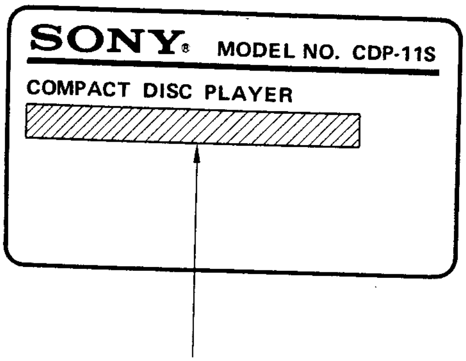
LASER APERTURE

4-885-839-01



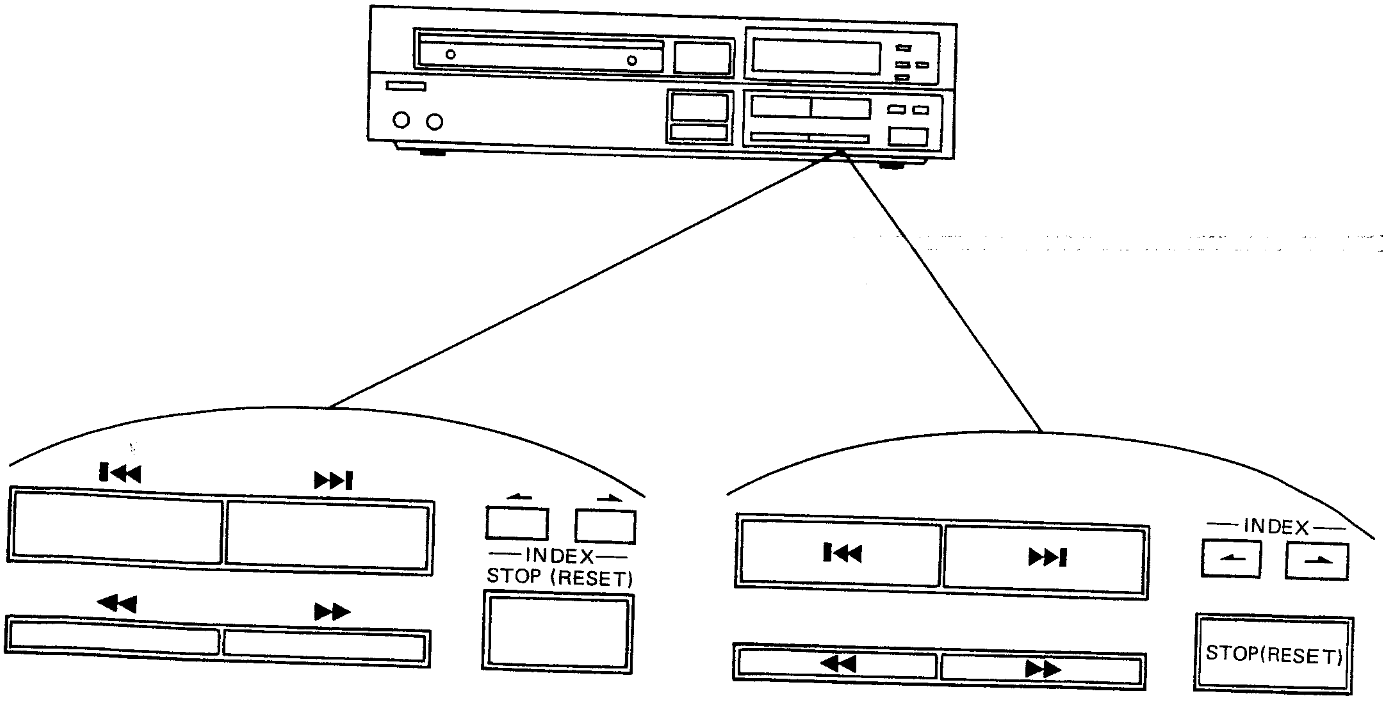
MODEL IDENTIFICATION

– Specification label on jack board –


SONY
MODEL NO. CDP-11S
COMPACT DISC PLAYER

AEP Model:	AC: 220 V ~ 50/60 Hz 24 W
UK Model:	AC: 240 V ~ 50/60 Hz 24 W
E Model:	AC: 110, 120, 220, 240 V ~ 50/60 Hz 24 W

CONTROL PANEL COLOR IDENTIFICATION


⏮
⏭
⏪
⏩
INDEX
STOP (RESET)
STOP(RESET)

Silver-A Type

Silver-B Type

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– CAUTION FOR ELECTROSTATIC BREAKDOWN –

NOTES ON HANDLING THE OPTICAL PICK-UP BLOCK (KSS-100A)

The laser diode in the optical pick-up block may suffer electrostatic breakdown because of the potential difference generated by the charged electrostatic load, etc. on clothing and the human body.

The printed matter below is included in the repair parts. During repair, use the procedure in the printed matter.

The following method is an example for reference purposes:

1. Place a conductive sheet on the workbench. (The black sheet used as repair parts wrapping.)
2. Place the set on the conductive sheet so that the chassis touches the sheet. (This makes it the same potential as the conductive sheet.)
3. Place your hands on the conductive sheet. (This makes them the same potential as the sheet.)
4. Remove the optical pick-up block from the bag (conductive).
5. Perform work on top of the conductive sheet. Be careful that clothing does not touch the optical pick-up block.

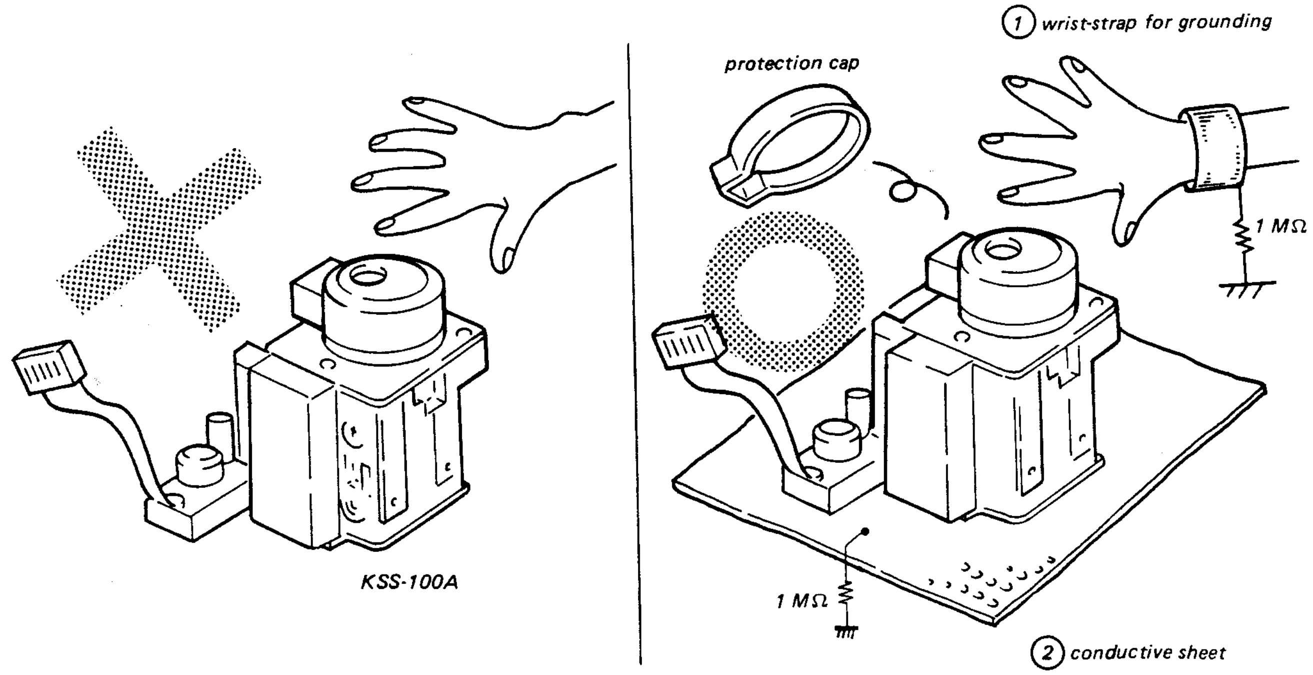
Printed Matter Included in the Repair Parts

When opening or repairing a KSS-100A, the procedure for grounding as follows is required to prevent damage caused by static electricity.

1 Grounding for the human body
Be sure to put on a wrist-strap for grounding (with impedance lower than 10^8 Ω) whose other end is grounded. The strap works to drain away the static electricity build-up on the human body.

2 Grounding for the work table
Be sure to lay on the table a conductive sheet (with impedance lower than 10^9 Ω) such as a sheet of copper, which is grounded.

3 As static electricity build-up on clothes is not drainded away, be careful not to let your clothes touch the KSS-100A.



SECTION 1
OUTLINE

1-1. FEATURES

Excellent Sound Quality and High Performance

The performance and sound quality surpass those of a conventional analog-type disc player.

○ Frequency response	5 Hz-20 kHz within ±0.5 dB
○ Dynamic range	more than 90 dB
○ Harmonic distortion	less than 0.004 % (1 kHz)
○ Channel separation	more than 90 dB
○ Wow & flutter	below measurable range

Full Auto Front Loading Linear Skating Disc Loading Mechanism

The disc is simply placed on the linear skating disc table, which goes in and out horizontally, in order to set the disc in the player. Then by pressing the PLAY button, the disc table closes, the disc is supported by the disc chucking mechanism and play begins.

Full-logic "Feather Touch" Operation

At the lightest touch, the "feather-touch" function buttons enable you to switch directly from one mode to another.

Digital Readout Display

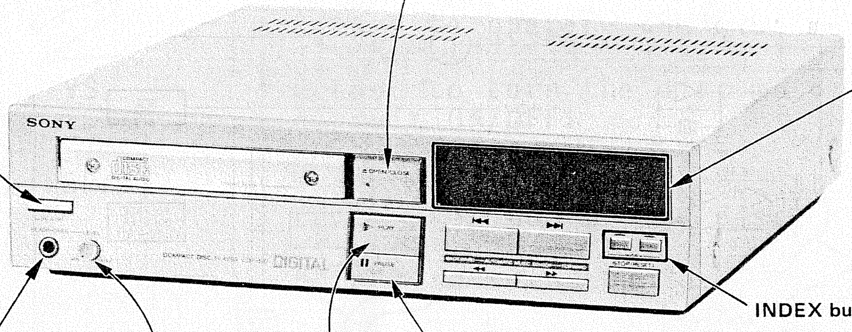
The track number and the playing time elapsed of the selection playing is shown on the display window. With one touch of the ELAPSED/REMAINING TIME button, this time display will change to indicate with a minus sign how much playing time is left on the disc.

Non-contact Signal Readout System

Because a laser beam is employed for signal pickup, there is no physical contact with the disc, which means no wear.

In addition, because the pit pattern is recorded below the surface of the disc, it is not necessary to be constantly on guard against dust, making the disc easy to handle.

1-2. LOCATION AND FUNCTION OF CONTROLS



≜ OPEN/CLOSE button and indicator
With one touch of this button the disc compartment opens for disc loading. The indicator on the OPEN/CLOSE button will illuminate while the compartment is opening. With another touch the compartment closes.

POWER switch

Display window

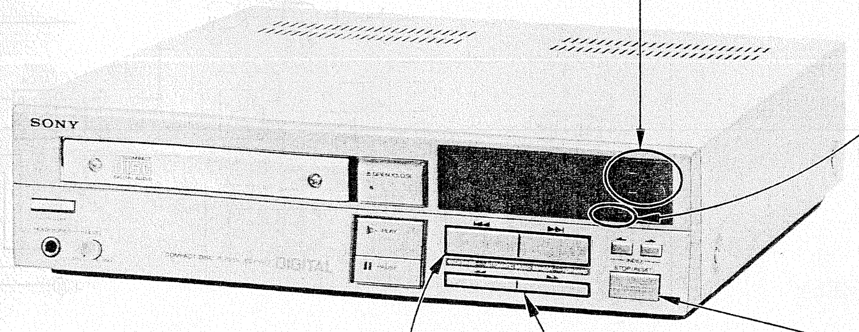
INDEX button

HEADPHONES jack

HEADPHONES LEVEL control

▌▌ PAUSE button and indicator
Press to pause during play. The built-in ▌▌ indicator will illuminate. To release the pause mode, press this button again. The indicator will go off and disc play resume.

▶ PLAY button and indicator
Press to start normal disc play. The built-in ▶ indicator will illuminate.



REPEAT programming buttons
ALL button: To repeat all the selections on the disc. To release repeat play, press the button again.
A ↔ B button: To repeat play between specific points on the disc. With one touch of this button the built-in indicator flickers and the point where the button has been pressed is memorized as the "A" (start) point of repeat play.
With another touch, the built-in indicator illuminates steadily and the point where the button has been pressed a second time is memorized as the "B" (end) point of repeat play.
When the **CLEAR** button is pressed, this repeat play will be cancelled.
Any repeat program is also cancelled when another REPEAT programming button is pressed.

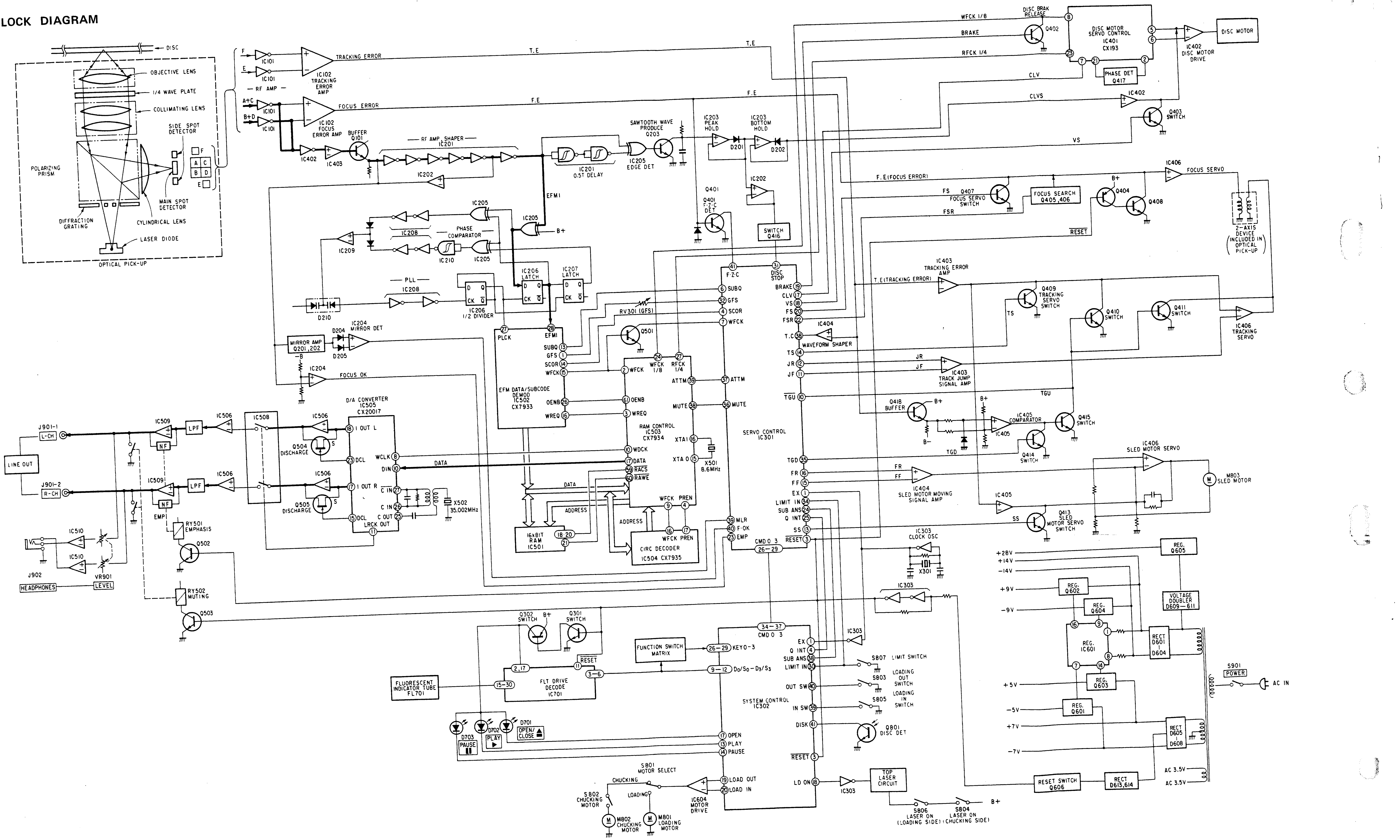
ELAPSED/REMAINING button
The time counter normally indicates elapsed time. When this button is pressed, the time counter will show the time remaining before the end of the last selection, preceded by a minus sign.
When this button is pressed a second time, the time counter will again become a normal time counter.

RESET button
When this button is pressed, disc play is reset to the very beginning of the first selection and player stands by.

Manual Search buttons
When you release this button, normal-speed play will resume (during play) or the player will return to the pause mode (during pause).
◀◀ button: To go backwards at a high speed.
▶▶ button: To skip ahead at a high speed.

AUTOMATIC MUSIC SENSOR buttons
I◀◀ (back selection) button:
Press to go back to a previous selection.
▶▶I (foward selection) button:
Press to skip ahead to a later selection.

1-3. BLOCK DIAGRAM


DISC
OBJECTIVE LENS
1/4 WAVE PLATE
COLLIMATING LENS
SIDE SPOT DETECTOR
POLARIZING PRISM
MAIN SPOT DETECTOR
DIFFRACTION GRATING
CYLINDRICAL LENS
LASER DIODE
OPTICAL PICK-UP
IC101 RF AMP
IC102 TRACKING ERROR AMP
TRACKING ERROR
IC102 FOCUS ERROR AMP
FOCUS ERROR
BUFFER Q101
IC402 IC403
RF AMP SHAPER IC201
IC202
IC201 0.5T DELAY
IC205 EDGE DET
SAWTOOTH WAVE PRODUCE Q203
IC203 PEAK HOLD
IC203 BOTTOM HOLD
D201 D202
EFMI
IC205
IC208 PHASE COMPARATOR
IC209 IC210
IC206 LATCH
IC207 LATCH
PLL IC208
IC206 1/2 DIVIDER
D210
MIRROR AMP Q201,202
IC204 MIRROR DET
D204 D205
IC204 FOCUS OK
EFM DATA/SUBCODE DEMOD IC502 CX7933
PLCK EFMI SUBQ GFS SCOR WFCK OENB WREQ
RV301 (GFS)
Q501
RAM CONTROL IC503 CX7934
WFCK 1/8 RFCK 1/4 ATTM MUTE XTAI XTA O
X501 8.6MHz
DATA RACS RAWE WDCK
16kBIT RAM IC501
ADDRESS
CIRC DECODER IC504 CX7935
WFCK PREN
D/A CONVERTER IC505 CX20017
OUT L OUT R DCL WCLK DIN C IN C OUT LRCK OUT
X502 35.002MHz
Q504 DISCHARGE
Q505 DISCHARGE
IC506 IC508 IC509 LPF NF
J901-1 L-CH
J901-2 R-CH
LINE OUT
IC510
J902 HEADPHONES
VR901 LEVEL
RY501 EMPHASIS
Q502
RY502 MUTING
Q503
SERVO CONTROL IC301
F.Z.C DISC STOP SUBQ GFS SCOR WFCK BRAKE CLV VS FS FSR T.C TS JR JF TGU TGD FR FF EX LIMIT IN SUB ANS Q INT SS RESET MLR F.OK EMP
Q401 F.Z.C DET
SWITCH Q416
IC404 WAVEFORM SHAPER
CMD O 3
WFCK 1/8 BRAKE RFCK 1/4 CLV CLVS VS
DISC BRAK RELEASE Q402
DISC MOTOR SERVO CONTROL IC401 CX193
PHASE DET Q417
IC402 DISC MOTOR DRIVE
DISC MOTOR
Q403 SWITCH
IC406 FOCUS SERVO
F.E (FOCUS ERROR)
FS Q407 FOCUS SERVO SWITCH
FSR
FOCUS SEARCH Q405,406
Q404 Q408
2-AXIS DEVICE (INCLUDED IN OPTICAL PICK-UP)
IC403 TRACKING ERROR AMP
T.E (TRACKING ERROR)
Q409 TRACKING SERVO SWITCH
Q410 SWITCH
Q411 SWITCH
IC406 TRACKING SERVO
IC403 TRACK JUMP SIGNAL AMP
Q418 BUFFER
IC405 COMPARATOR
Q415 SWITCH
Q414 SWITCH
IC406 SLED MOTOR SERVO
M803 SLED MOTOR
IC404 SLED MOTOR MOVING SIGNAL AMP
IC405
Q413 SLED MOTOR SERVO SWITCH
IC303 CLOCK OSC
X301
IC303
Q302 SWITCH
Q301 SWITCH
FUNCTION SWITCH MATRIX
KEYO-3
Do/So-D3/S3
FLT DRIVE DECODE IC701
FLUORESCENT INDICATOR TUBE FL701
D703 PAUSE
D702 PLAY
D701 OPEN/CLOSE
SYSTEM CONTROL IC302
EX Q INT SUB ANS LIMIT IN OUT SW IN SW DISK RESET LD ON
OPEN PLAY PAUSE LOAD OUT LOAD IN
S807 LIMIT SWITCH
S803 LOADING OUT SWITCH
S805 LOADING IN SWITCH
Q801 DISC DET
TOP LASER CIRCUIT
S806 LASER ON (LOADING SIDE)
S804 LASER ON (CHUCKING SIDE)
S801 MOTOR SELECT
S802 CHUCKING MOTOR
IC604 MOTOR DRIVE
M802 CHUCKING MOTOR
M801 LOADING MOTOR
+28V +14V -14V +9V -9V +5V -5V +7V -7V
REG. Q605
REG. Q602
REG. Q604
VOLTAGE DOUBLER D609-611
REG. IC601
RECT D601-D604
REG. Q603
REG. Q601
RECT D605-D608
RESET SWITCH Q606
RECT D613,614
AC 3.5V
S901 POWER
AC IN

SECTION 2
CIRCUIT DESCRIPTION

2-1. MICROCOMPUTERS

2-1-1. Servo Circuit Control IC's (IC301) Terminal Functions

Pin NO.	Pin Name	Function
1	EX	Clock signal input pin. (6MHz)
3	$\overline{\text{RESET}}$	Reset signal input pin.
4	SCOR	SUB•Q sync signal input pin.
6	SUB•Q	SUB•Q signal (containing music address, emphasis information) input pin.
7	WFCK	WFCK (Write Frame Clock) input pin.
10	$\overline{\text{TGU}}$	Output to switch the tracking servo gain.
11	J•F	Output when track jump is forward.
12	J•R	Output when track·jump is reverse.
13	S•S	Output to turn the sled motor servo circuit ON/OFF.
14	T•S	Output to turn the tracking servo circuit ON/OFF.
15	F•F	Output to move the sled motor forward.
16	F•R	Output to move the sled motor reverse.
17	CLV	Output to operate the disc motor servo circuit.
18	VS	Output to turn the disc motor servo run-up-circuit ON/OFF.
19	BRAKE	When the disc is stopped, this output releases the brake mode of the disc motor servo circuit.
20	F•S	Output to turn the focus servo circuit ON/OFF.
21	GND	Ground connection.
22	F•SR	Output for focus search signal.
23	EMPHA	Output to turn the emphasis circuit ON/OFF.
24	S•ANS	When IC302 reads in sub-code signal from IC301, IC302 outputs to this pin to inform that read-in is completed.

Pin NO.	Pin Name	Function
25	Q·INT	Output for sync signal of data to feed to IC302.
26-29	COMO-3	Input /output pins for information to/from IC302.
30	M·REQ	M·REQ signal input from IC302 to here.
31	DISC STOP	Detects disc stop after servo circuit is braked.
32	GFS	GFS (Guard Frame Sync) signal input pin. When this set reading in data normally, high is input here.
33	TEST	When this pin is made low, even if the data is not read out, the disc is not ejected.
34	LIMIT IN	Detects that TOP is in starting position. When TOP is in starting position, low is input here.
35	$\overline{\text{TGD}}$	Output for tracking servo gain up nullity signal.
36	MUTE	Output for sound mute signal.
37	ATT	Output for sound attenuation signal.
39	MLR	Mirror signal input pin.
40	F·OK	Low is input here when 2-axis device is ready to read data. IC301 knows focus is correct by this input and F·Z·C input and turns on focus servo circuit.
41	F·Z·C	F·Z·C (Focus Zero Cross) signal input pin.
42	V_{DD}	Power supply pin. (5V DC)

2-1-2. System Control IC's (IC302) Terminal Functions

Pin NO.	Pin Name	Function
1	EX	Clock signal input pin.(6MHz)
3	$\overline{\text{RESET}}$	Reset signal input pin.
4	Q·INT	Q·INT signal input from IC301 to here.
9-12	D_0/S_0-D_3/S_3	Output for key scan signal.
13	PLAY	Output to indicate play lamp (D702).
14	PAUSE	Output to indicate pause lamp (D703).
17	OPEN	Output to indicate open lamp (D701).
18	L·D·ON	Output to turn the laser diode ON/OFF.
19	LOAD OUT	Output to move the loading motor opened.
20	LOAD IN	Output to move the loading motor closed.
21	GND	Ground connection.
22	IDp	Output for FLT control signal.
23	RST	When IC302 send the data to IC701, low is output here.
24	CTL	Output for clock signal of data to feed to IC701.
25	M·REQ	Outputs request output when reading in sub-code signal from IC301.
26-29	KEY0-3	Key scan data input pin.
30	LIMIT IN	Detects that TOP is in starting position.
34-37	COM0-3	Input/output pins for informatiom to/from IC301.
38	S·ANS	S·ANS signal input pin.
39	IN SW	Detects that disc table closed.
40	OUT SW	Detects that disc table opened.
41	DISC	Detects that disc is set on disc table.
42	V_{DD}	Power supply pin. (5V)

2-2. DATA READ-OUT CIRCUIT

2-2-1. RF Offset Amp

The main spot detectors (A+C), (B+D) are amplified at IC101(A) and (B) respectively, then divided into focus error and data read out voltages.
The data read-out voltage is added together at IC101(C) and becomes (A+B+C+D). After this it is further amplified at RF offset amp IC103. The RF offset amp sets the DC level of Q101 emitter. The voltage is set by RV104 to be -1.9V DC in stop state.

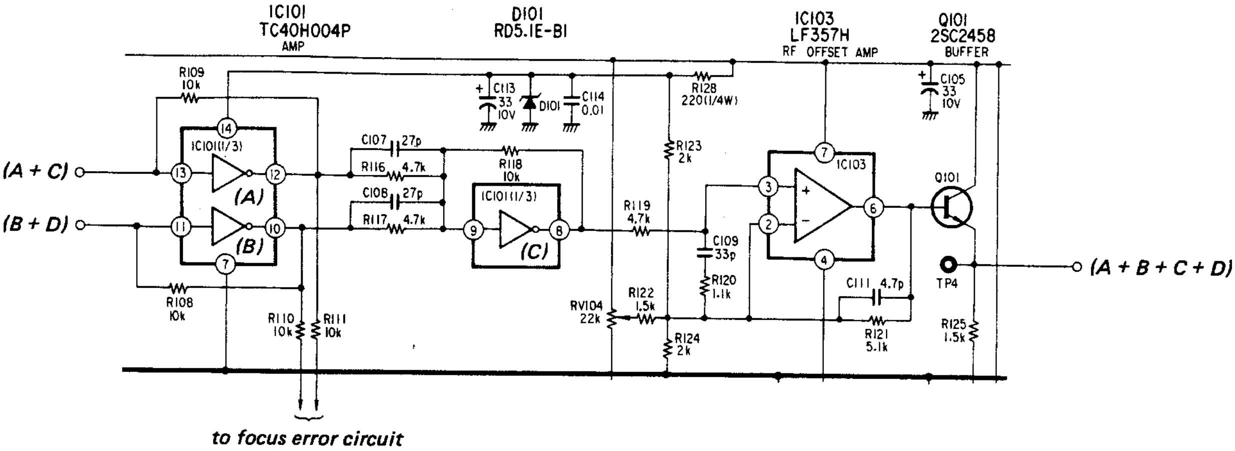

IC101
TC40H004P
AMP
D101
RD5.1E-B1
IC103
LF357H
RF OFFSET AMP
Q101
2SC2458
BUFFER
R109
10k
C113
33
10V
D101
C114
0.01
R128
220(1/4W)
C105
33
10V
IC101(1/3)
14
13
12
11
10
7
(A)
(B)
(A + C)
(B + D)
C107 27p
R116 4.7k
C108 27p
R117 4.7k
R118
10k
IC101(1/3)
9
8
(C)
R119
4.7k
R123
2k
C109
33p
R120
1.1k
IC103
7
3
2
6
4
Q101
TP4
(A + B + C + D)
C111 4.7p
R121
5.1k
R125
1.5k
RV104
22k
R122
1.5k
R124
2k
R108
10k
R110
10k
R111
10k
to focus error circuit

Fig. 1 RF Offset Amp

2-2-2. Waveform Shaper Circuit

This circuit corrects heterogeneous RF output resulting from disc irregularities, and gets the correct zero-cross point on the eye pattern. The RF signal from C201 is shaped and amplified at IC201. After integration, the signal becomes DC and controls IC201 input bias. At this time the probability of occurrence of 1, 0 is equal, so IC202 output voltage operates so that this circuit always slices the center of eye pattern.

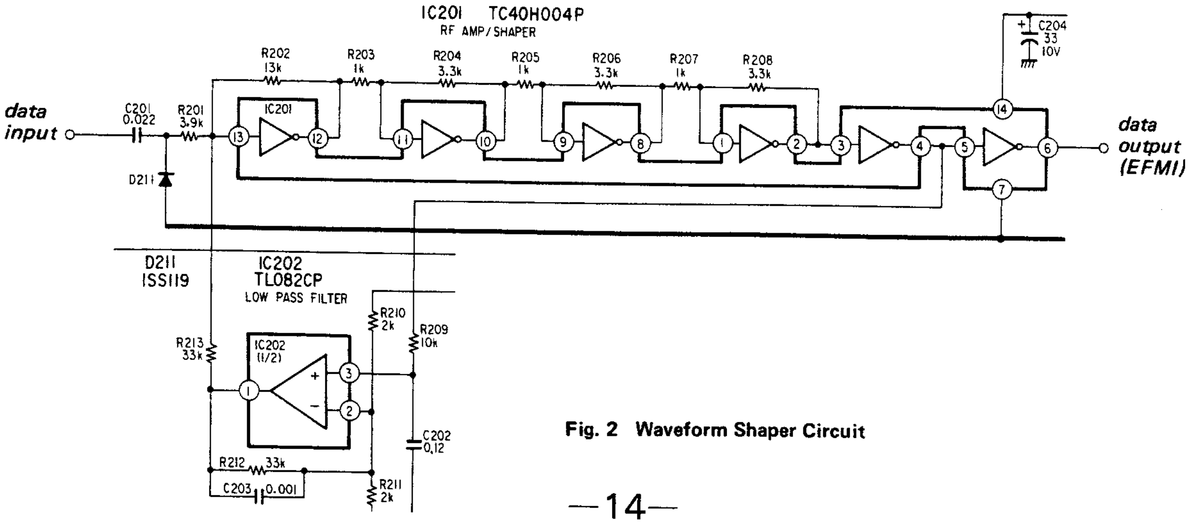
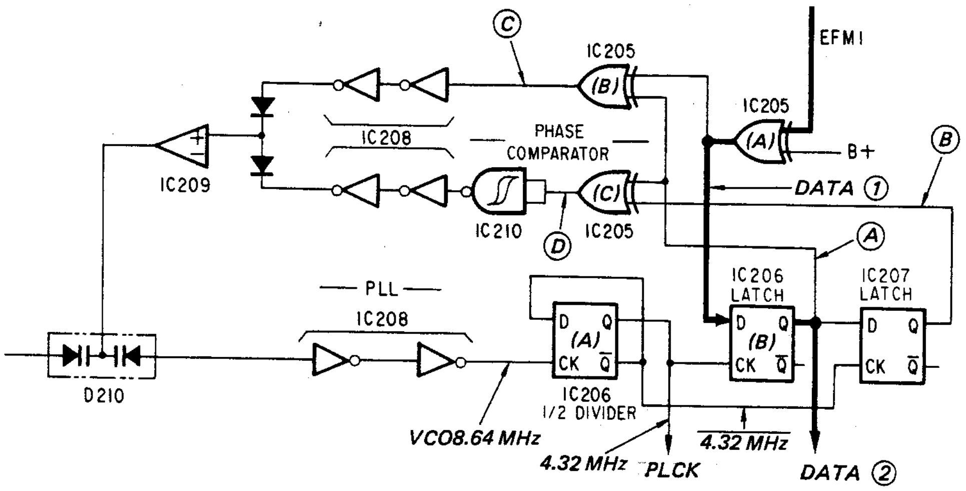

IC201 TC40H004P
RF AMP/SHAPER
C204
33
10V
R202
13k
R203
1k
R204
3.3k
R205
1k
R206
3.3k
R207
1k
R208
3.3k
data
input
C201
0.022
R201
3.9k
IC201
13
12
11
10
9
8
1
2
3
4
5
6
14
7
D211
data
output
(EFMI)
D211
1SS119
IC202
TL082CP
LOW PASS FILTER
R213
33k
IC202
(1/2)
1
3
2
R210
2k
R209
10k
C202
0.12
R212 33k
C203 0.001
R211
2k

Fig. 2 Waveform Shaper Circuit

2-2-3. PLCK Generating Circuit

The data read out by optical pick-up includes a 2.16MHz clock element. In order for IC502(CX-7933) to read in data, a 4.32MHz clock (PLCK) synchronized with the data clock (2.16MHz) is necessary.
The 4.32MHz clock (PLCK) is obtained by PLL generating circuit. The VCO oscillation frquency is 8.64MHz. This output is 1/2 frequency divided at IC206(A). The EFM data is inverted at IC205(A) and it is latched at IC206(B) Ⓐ. This signal is latched by 4.32MHz Ⓑ. The EFM data and Ⓐ input the IC205 and it output the Ⓒ. Ⓐ and Ⓑ input the IC205(C) and it output the Ⓓ. Ⓒ and Ⓓ is made DC and cntrols VCO.
When VCO frequency rize, D210 input potential drops. Therefore D210 capacitance increases, so VCO frequency is controlled down.



Ⓒ
IC205
(B)
EFMI
IC205
(A)
B+
Ⓑ
IC208
PHASE COMPARATOR
IC209
(C)
DATA ①
IC210
Ⓓ
IC205
Ⓐ
IC206 LATCH
IC207 LATCH
PLL
IC208
D Q
(A)
CK Q̄
D Q
(B)
CK Q̄
D Q
CK Q̄
D210
IC206
1/2 DIVIDER
VCO8.64 MHz
4.32 MHz
PLCK
4.32 MHz
DATA ②

Fig. 3 PLCK Generating Circuit's Block Diagram

- **PLCK Generating Circuit Waveform of Each Section**

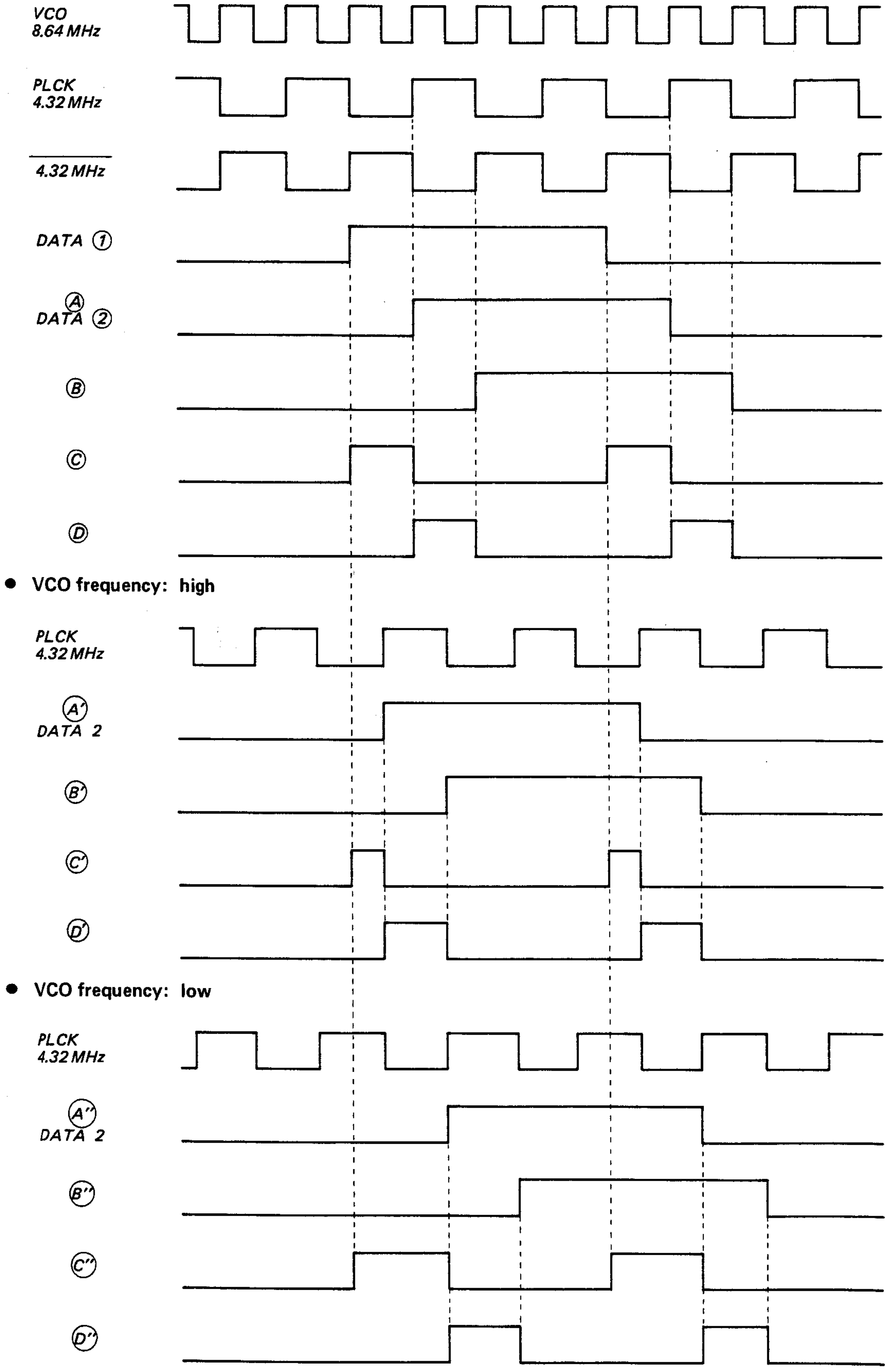

VCO
8.64 MHz
PLCK
4.32 MHz
$\overline{4.32\ \text{MHz}}$
DATA ①
Ⓐ
DATA ②
Ⓑ
Ⓒ
Ⓓ
• VCO frequency: high
PLCK
4.32 MHz
Ⓐ'
DATA 2
Ⓑ'
Ⓒ'
Ⓓ'
• VCO frequency: low
PLCK
4.32 MHz
Ⓐ''
DATA 2
Ⓑ''
Ⓒ''
Ⓓ''

Fig. 4 PLCK Timing Chart

2-3. DIGITAL PROCESSING LSI

Almost all of the digital processing is performed IC502(CX-7933), IC503(CX-7934) and IC504(CX-7935).
The following table outlines the function division of the 3 chips.

	IC502 (CX-7933)	IC503 (CX-7934)	IC504 (CX-7935)
Process	N channel silicon gate E/D MOS	N channel silicon gate E/D MOS	N channel silicon gate E/D MOS
No. of elements	4849 transistors	9725 transistors	13080 transistors
Operational speed	4.32MHz	2.16MHz (Primary OSC. 8.64MHz)	4.32MHz
Power supply voltage	5V single power supply	5V single power supply	5V single power supply
Power consumption	350 mW	550 mW	720 mW
Input/output level	TTL compatible	TTL compatible	TTL compatible
Package	28 pin DIP plastic mold	70 pin FP plastic mold	28 pin DIP plastic mold
Functions	1.EFM data demodulation. 2.Subcode signal demodulation. 3.Detection, protection and interpolation of frame sync signal. 4.Generates interface signal	1.Generates RAM control signal. 2.Interpolation circuit. 3.Interface to D/A converter. 4.Generates reference signal for CLV.	1.Error detection and correction. (CIRC decode)

2-3-1. IC502(CX-7933)

IC502(CX-7933) performs the function of EFM demodulation, subcode signal demodulation, detection of frame sync signal, protection from dropout and interpolation of sync signal, and generation of CLV reference signal. For EFM demodulation, in order to return 2^8=256, 4 bit channel data to 8 symbol data, logic array is employed for reverse conversion.
For subcode signal demodulation, detection of two types (S_0,S_1) of sync pattern alloted for the subcode is necessary.
Subcode processing is performed by 4 bit micrcomputer IC301, which has a buffer for easier interface, and the subcode can be read out by applying an external clock signal.
Because CLV is used in CD system, servo is applied using the clock signal detected from the EFM signal. The PLL is employed for clock signal detection, but it is only effective when PLL is properly locked, so a countermeasure is required in the event that PLL is not locked during power on, dropout, etc.
CX-7933 uses the 4.32MHz signal extracted by PLL as a master clock, and the demodulated data is written directy into the external RAM.

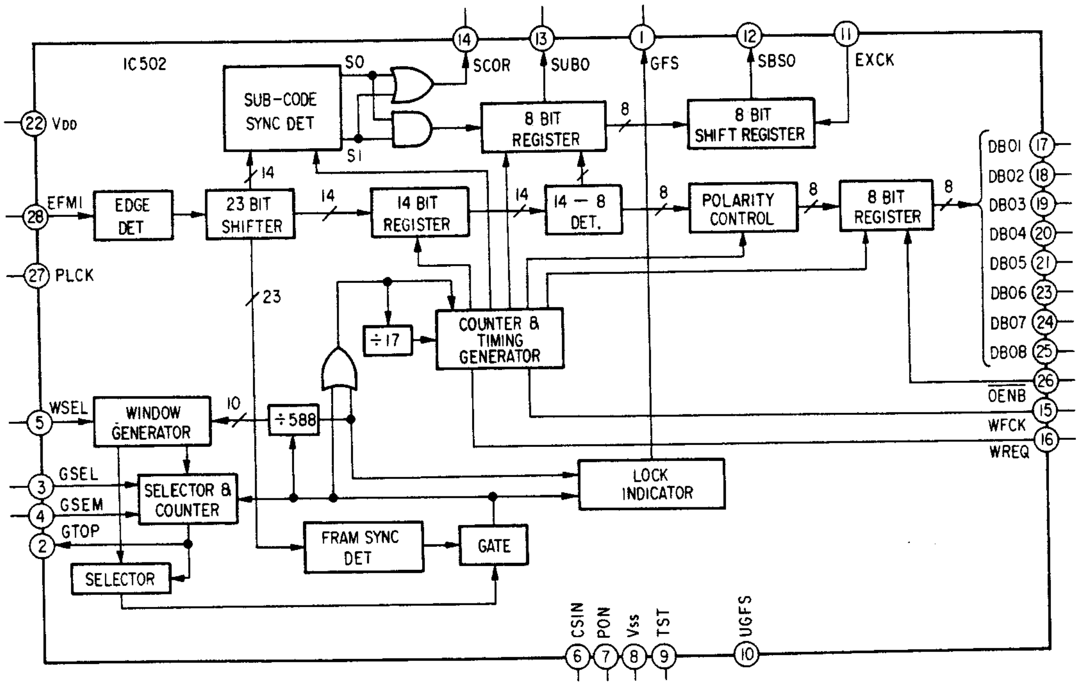

IC502
SUB-CODE SYNC DET
S0
S1
14 SCOR
13 SUBO
1 GFS
12 SBSO
11 EXCK
8 BIT REGISTER
8 BIT SHIFT REGISTER
22 VDD
28 EFMI
EDGE DET
23 BIT SHIFTER
14 BIT REGISTER
14 — 8 DET.
POLARITY CONTROL
8 BIT REGISTER
27 PLCK
23
÷17
COUNTER & TIMING GENERATOR
5 WSEL
WINDOW GENERATOR
10
÷588
3 GSEL
4 GSEM
2 GTOP
SELECTOR & COUNTER
SELECTOR
FRAM SYNC DET
GATE
LOCK INDICATOR
DB01 17
DB02 18
DB03 19
DB04 20
DB05 21
DB06 23
DB07 24
DB08 25
26 OENB
15 WFCK
16 WREQ
6 CSIN
7 PON
8 Vss
9 TST
10 UGFS
14
8

Fig. 5 IC502 Block Diagram

2-3-2. IC503 (CX-7934)

IC503 (CX-7934) is an LSI which cnotrols all of the digital processing for CX-7933, CX-7935, 16k RAM and D/A converter. The contents are divided into RAM address and control signal generator, interpolation circuit and D/A converter interface circuit. Each LSI performs data write-in and read-out through a data bus in common with RAM, but when the demand signal from each LSI is received, CX-7934 establishes order of priority,processes, calculates the prescribed RAM address and applies access. The RAM is used for the three of de-interleave, correction buffer, and jitter absorption. The jitter absorption capacity is ±4 frames. In case there is overflow or underflow in the memory, the address counter is automatically reset to prevent generation of abnormal sound. The interpolation circuit performs mean-value interpolation in case where correction was not possible at the C_2 decoder. If the data has errors in more than two successive words (4 symbols), previous value hold and mean-value interpolation are performed. Serial or parallel interface with the D/A converter is possible, and a divider for CLV reference signal generation is also built in. IC503 (CX-7934) operates on an 8.64MHz master clock, and has a built-in oscillation circuit for crystal oscillation.

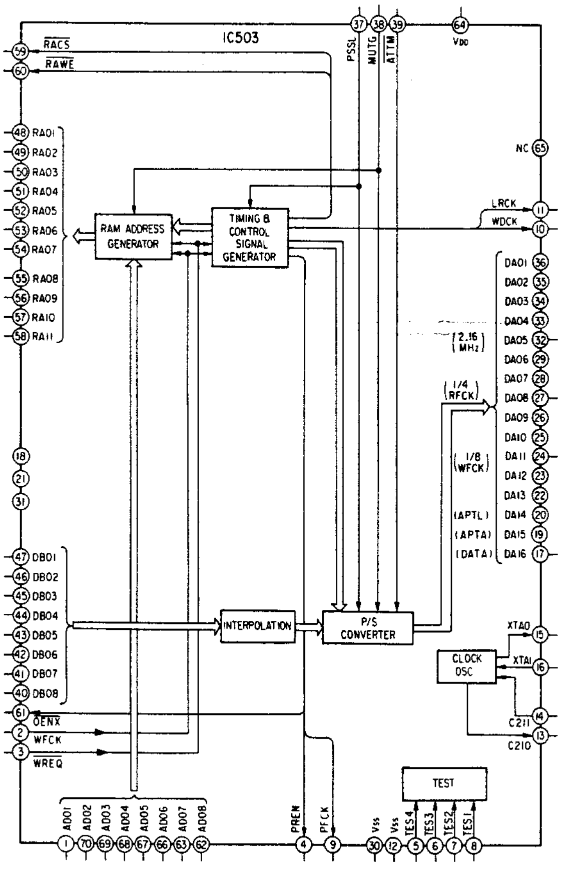

IC503
59 RACS
60 RAWE
37 PSSL
38 MUTG
39 ATTM
64 VDD
NC 65
48 RA01
49 RA02
50 RA03
51 RA04
52 RA05
53 RA06
54 RA07
55 RA08
56 RA09
57 RA10
58 RA11
RAM ADDRESS GENERATOR
TIMING & CONTROL SIGNAL GENERATOR
LRCK 11
WDCK 10
DA01 36
DA02 35
DA03 34
DA04 33
DA05 32
DA06 29
DA07 28
DA08 27
DA09 26
DA10 25
DA11 24
DA12 23
DA13 22
DA14 20
DA15 19
DA16 17
(2.16 MHz)
(1/4 RFCK)
(1/8 WFCK)
(APTL)
(APTA)
(DATA)
18
21
31
47 DB01
46 DB02
45 DB03
44 DB04
43 DB05
42 DB06
41 DB07
40 DB08
INTERPOLATION
P/S CONVERTER
XTAO 15
XTAI 16
CLOCK OSC
C211 14
C210 13
61 OENX
2 WFCK
3 WREQ
TEST
AD01 1
AD02 70
AD03 69
AD04 68
AD05 67
AD06 66
AD07 63
AD08 62
PREN 4
PFCK 9
Vss 30
Vss 12
TES4 5
TES3 6
TES2 7
TES1 8

Fig. 6 IC503 Block Diagram

2-3-3. IC504 (CX-7935)

IC504 (CX-7935) is an LSI which achieves CIRC decoding, a new super strategy in decoding methods. The operation of CX-7934 inputs de-interleaved C_1 and C_2, of 32 and 28 symbols respectively, data and pointers to CX-7935. Microprogram control and a pipeline operation circuit are employed in order to process a complicated correction algorithm within a limited time. The syndrom is calculated, and the results after correcting are written into the external RAM via the data bus. The results of the correction operation can be monitored at the 4-bit output pins, and dropout state can be detected C_1 and C_2 correction are done by time sharing processing, and about 200 steps are required for entire longest pass. The master clock is 2.16MHz.

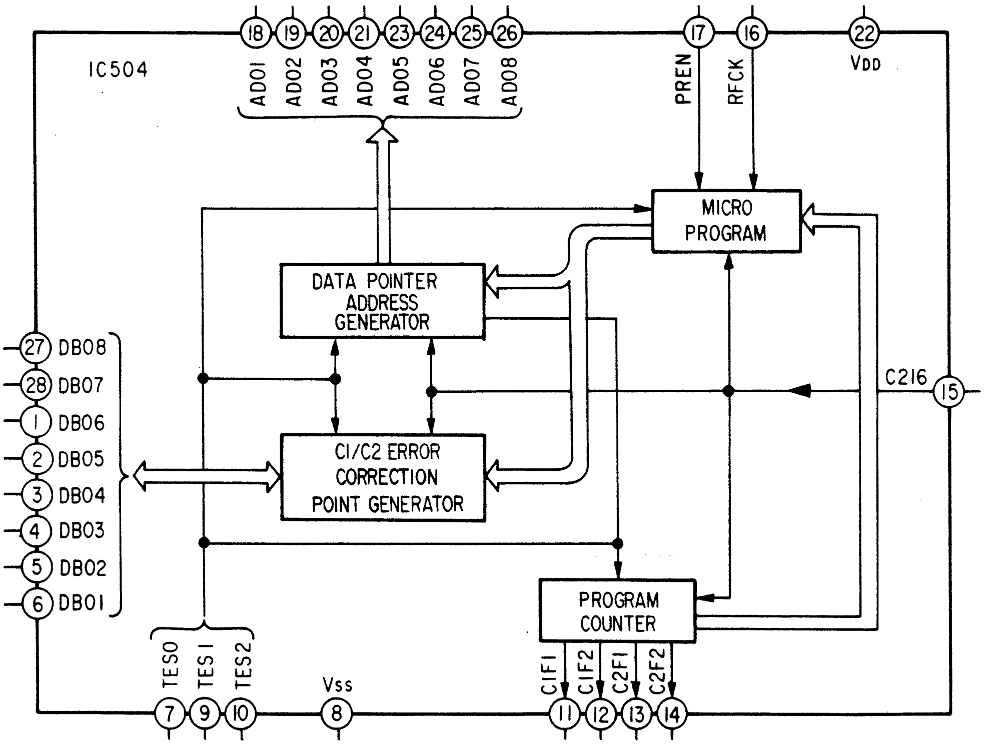
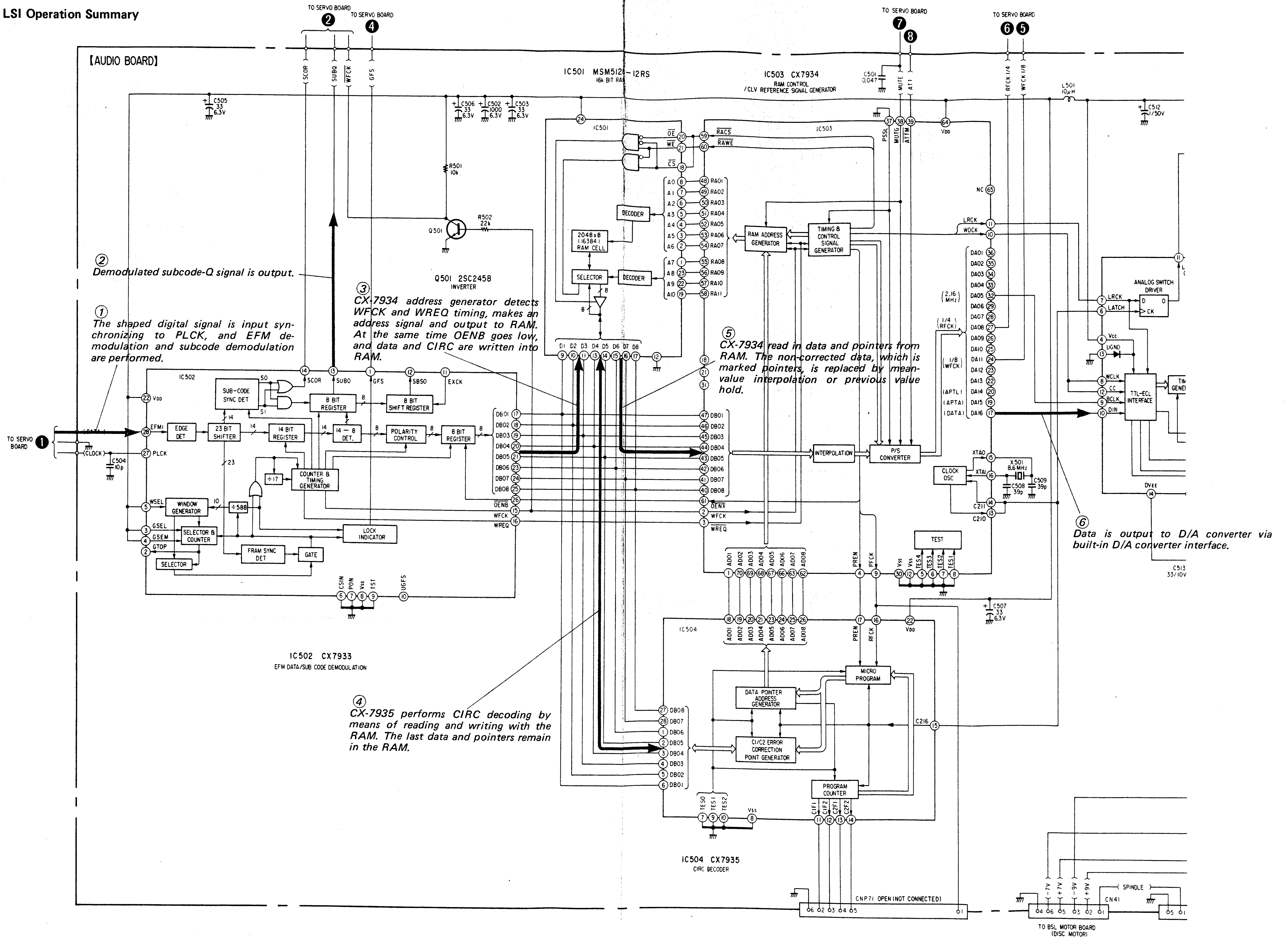

IC504
18
19
20
21
23
24
25
26
AD01
AD02
AD03
AD04
AD05
AD06
AD07
AD08
17
16
22
PREN
RFCK
VDD
MICRO PROGRAM
DATA POINTER ADDRESS GENERATOR
C1/C2 ERROR CORRECTION POINT GENERATOR
PROGRAM COUNTER
C216
15
27 DB08
28 DB07
1 DB06
2 DB05
3 DB04
4 DB03
5 DB02
6 DB01
TES0
TES1
TES2
7
9
10
Vss
8
C1F1
C1F2
C2F1
C2F2
11
12
13
14

Fig. 7 IC504 Block Diagram

2-3-4. Digital Processing LSI Operation Summary


[AUDIO BOARD]
TO SERVO BOARD ❷
TO SERVO BOARD ❹
SCOR
SUBQ
WFCK
GFS
C505 33 6.3V
C506 33 6.3V
C502 1000 6.3V
C503 33 6.3V
R501 10k
R502 22k
Q501
Q501 2SC2458 INVERTER
IC501 MSM5128-12RS 16k BIT RAM
IC503 CX7934 RAM CONTROL /CLV REFERENCE SIGNAL GENERATOR
TO SERVO BOARD ❼ ❽
TO SERVO BOARD ❻ ❺
C501 0.047
MUTE
ATT
RFCK 1/4
WFCK 1/8
L501 10μH
C512 1/50V
PSSL
MUTG
ATTM
VDD
NC
LRCK
WDCK
OE
WE
CS
A0 A1 A2 A3 A4 A5 A6 A7 A8 A9 A10
RA01 RA02 RA03 RA04 RA05 RA06 RA07 RA08 RA09 RA10 RA11
RACS
RAWE
DECODER
2048×8 (16384) RAM CELL
SELECTOR
RAM ADDRESS GENERATOR
TIMING & CONTROL SIGNAL GENERATOR
DA01 DA02 DA03 DA04 DA05 DA06 DA07 DA08 DA09 DA10 DA11 DA12 DA13 DA14 DA15 DA16
(2.16 MHz)
(1/4 RFCK)
(1/8 WFCK)
(APTL)
(APTA)
(DATA)
ANALOG SWITCH DRIVER
LRCK
LATCH
Vcc
UGND
WCLK
CC
BCLK
DIN
TTL-ECL INTERFACE
DVEE
D1 D2 D3 D4 D5 D6 D7 D8
IC502
SUB-CODE SYNC DET
SO
S1
SCOR
SUBQ
GFS
SBSO
EXCK
8 BIT REGISTER
8 BIT SHIFT REGISTER
TO SERVO BOARD ❶
(DATA)
(CLOCK)
C504 10p
VDD
EFMI
PLCK
EDGE DET
23 BIT SHIFTER
14 BIT REGISTER
14 → 8 DET.
POLARITY CONTROL
8 BIT REGISTER
÷17
COUNTER & TIMING GENERATOR
WSEL
WINDOW GENERATOR
÷588
GSEL
GSEM
GTOP
SELECTOR & COUNTER
SELECTOR
FRAM SYNC DET
GATE
LOCK INDICATOR
CSIN
PON
Vss
TST
UGFS
DB01 DB02 DB03 DB04 DB05 DB06 DB07 DB08
OENB
WFCK
WREQ
OENX
INTERPOLATION
P/S CONVERTER
XTAO
XTAI
X501 8.6MHz
C508 39p
C509 39p
CLOCK OSC
C211
C210
TEST
Vss TES4 TES3 TES2 TES1
AD01 AD02 AD03 AD04 AD05 AD06 AD07 AD08
PREN
RFCK
PFCK
C507 33 6.3V
C513 33/10V
IC502 CX7933 EFM DATA/SUB CODE DEMODULATION
IC504
MICRO PROGRAM
DATA POINTER ADDRESS GENERATOR
C1/C2 ERROR CORRECTION POINT GENERATOR
PROGRAM COUNTER
C216
TES0 TES1 TES2
C1F1 C1F2 C2F1 C2F2
IC504 CX7935 CIRC DECODER
CNP71 OPEN (NOT CONNECTED)
CN41
SPINDLE
-7V +7V -9V +9V
TO BSL MOTOR BOARD (DISC MOTOR)

② Demodulated subcode-Q signal is output.

① The shaped digital signal is input synchronizing to PLCK, and EFM demodulation and subcode demodulation are performed.

③ CX-7934 address generator detects WFCK and WREQ timing, makes an address signal and output to RAM. At the same time OENB goes low, and data and CIRC are written into RAM.

⑤ CX-7934 read in data and pointers from RAM. The non-corrected data, which is marked pointers, is replaced by mean-value interpolation or previous value hold.

④ CX-7935 performs CIRC decoding by means of reading and writing with the RAM. The last data and pointers remain in the RAM.

⑥ Data is output to D/A converter via built-in D/A converter interface.

Fig. 8

2-4. D/A CONVERTER

IC505(CX-20017) uses the integral method, and is a 16 bit D/A converter IC for PCM audio. By adding an integrator, analog switch, and low pass filter to the outside of the IC, an analog signal can be reproduced from a 16 bit digital signal.

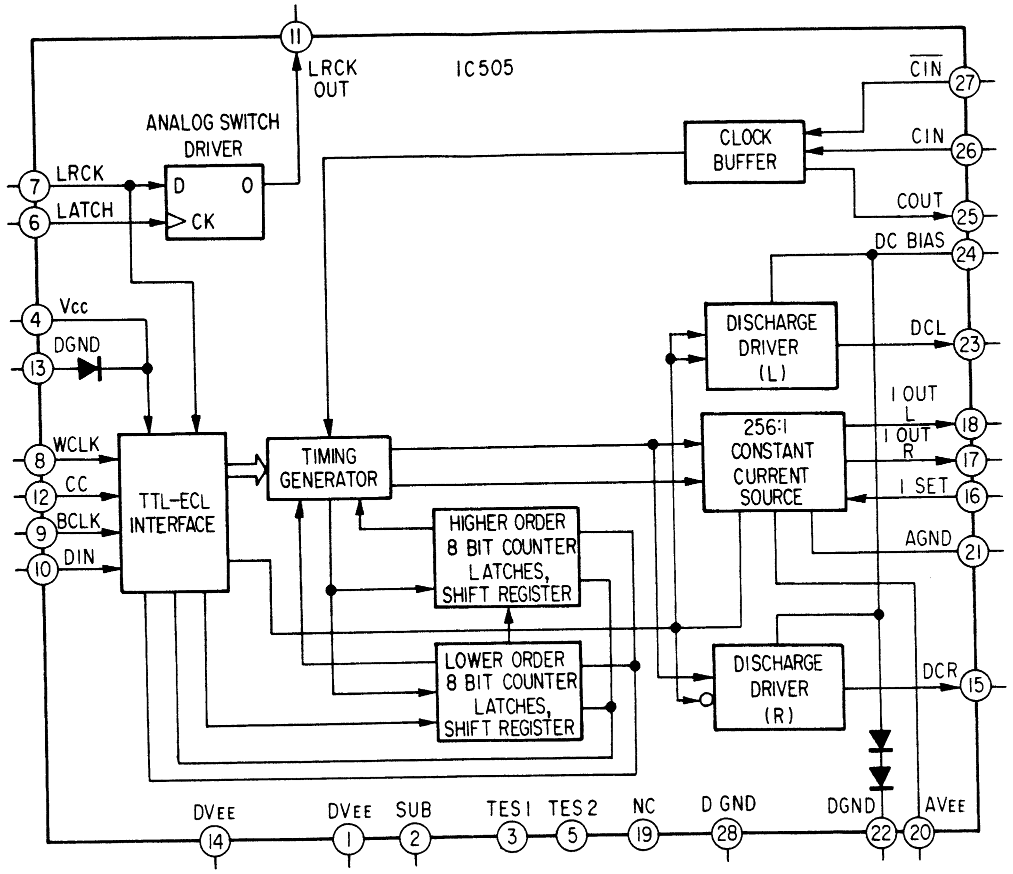

IC505
LRCK OUT
ANALOG SWITCH DRIVER
D
O
CK
LRCK
LATCH
Vcc
DGND
WCLK
CC
BCLK
DIN
TTL-ECL INTERFACE
TIMING GENERATOR
HIGHER ORDER 8 BIT COUNTER LATCHES, SHIFT REGISTER
LOWER ORDER 8 BIT COUNTER LATCHES, SHIFT REGISTER
CLOCK BUFFER
DISCHARGE DRIVER (L)
256:1 CONSTANT CURRENT SOURCE
DISCHARGE DRIVER (R)
CIN
CIN
COUT
DC BIAS
DCL
I OUT L
I OUT R
I SET
AGND
DCR
DVEE
DVEE
SUB
TES1
TES2
NC
D GND
DGND
AVEE
11
27
26
25
24
23
18
17
16
21
15
7
6
4
13
8
12
9
10
14
1
2
3
5
19
28
22
20

Fig. 9 IC505 Block Diagram

2-5. ANALOG AMP

2-5-1. LPF (Low Pass Filter)

The signal from the analog switch IC508 is 44kHz PAM (Pulse Amplitude Modulation) wave in which the heights of each of the pulses would be equal to the heights of the sampled pulses during recording, except for some slight error in quantization.
This signal contains a large number of high frequency components besides the basic wave. Since all these high frequency components are in the non-audible range, it would not matter if this wave were reproduced without passing it through a low pass filter.
However, if the subsequent circuits are even slightly non linear, it will cause intermodulation between the various frequency components and cause deterioration of sound quality. This LPF with 20kHz cut-off frequency is used to prevent this.

2-5-2. De-emphasis Circuit

This circuit consists of R523 and C529 for L-ch, and R524 is shorted by a relay to operate the circuit.
IC509 is a noninverting amplifier shown in Fig. 10.

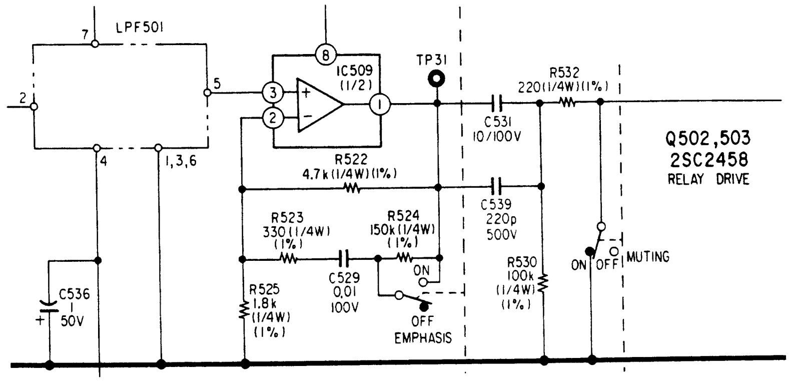

LPF501
7
2
5
4
1,3,6
IC509 (1/2)
8
3
2
1
TP31
R532 220(1/4W)(1%)
C531 10/100V
R522 4.7k(1/4W)(1%)
C539 220p 500V
R523 330(1/4W)(1%)
R524 150k(1/4W)(1%)
C529 0.01 100V
R525 1.8k (1/4W) (1%)
C536 1 50V
ON
OFF
EMPHASIS
R530 100k (1/4W) (1%)
ON
OFF
MUTING
Q502,503 2SC2458
RELAY DRIVE

Fig. 10 De-emphasis Circuit

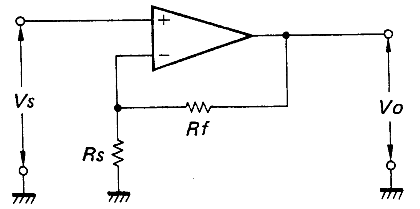


Fig. 11 Noninverting Amplifier

The gain of this circuit is expressed by:

$$\frac{V_o}{V_s} = \frac{R_s + R_f}{R_s} = 1 + \frac{R_f}{R_s}$$

As shown by this,if R524 is shorted, impedance in the Rf high range is decreased by R523 and C529, and as a result, high range gain is lowerwd and de-emphasis operates.

2-6. SERVO

CDP-11S has four servo the disc motor servo which control the compact disc CLV, the focus servo which controls the optical system (TOP), and the tracking servo and sled motor servo.

·Disc Motor Servo
CLV servo is applied by IC401(CX-193). The FG signal usually obtained from the edge of turntable is the WFCK 1/8 signal on CDP-11S, obtained from the RF PLL, and the reference signal for comparison is RFCK 1/4, from the LSI master clock.

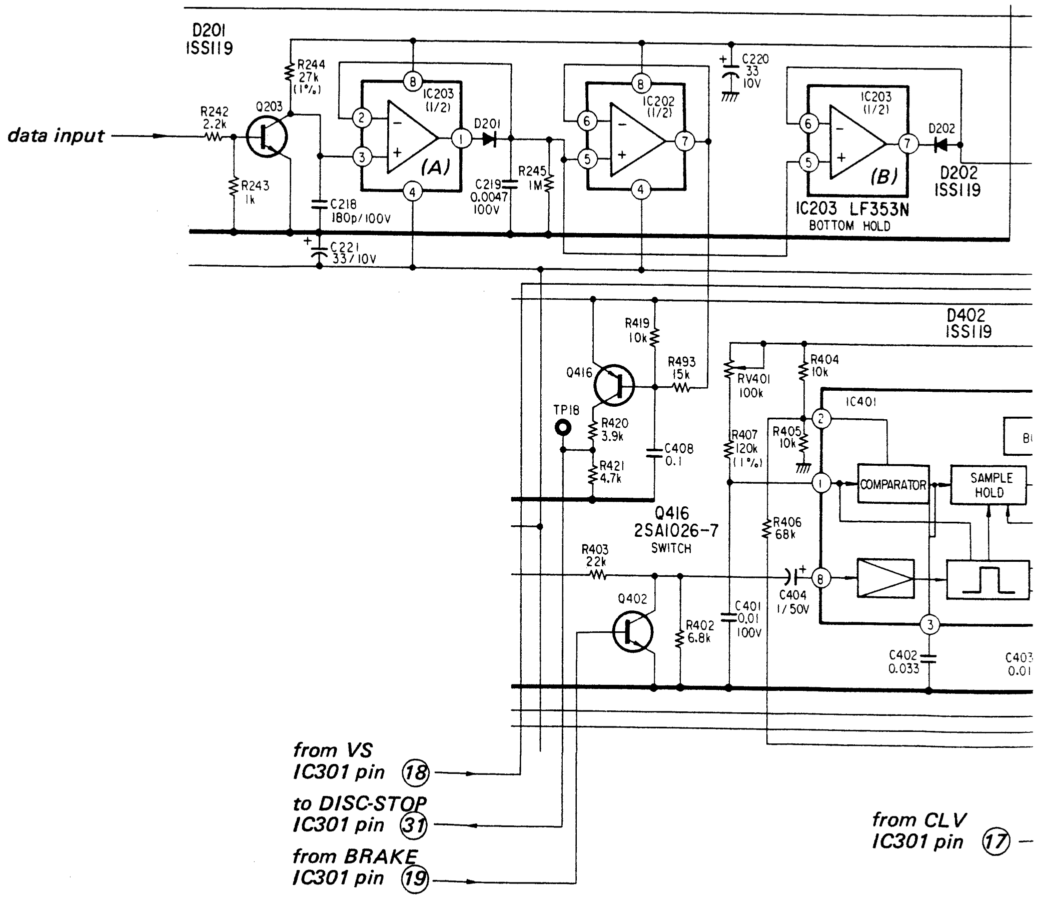
·Focus Servo
Controls the vertical movement of the optical system's objective lens for correct focusing on the compact disc.

·Tracking Servo
Controls the objective lens in the pit track direction, and keeps the laser on the pit track.

·Sled Motor Servo
The sled motor moves the optical system between the inside and outside circumferences of the disc.
By applying servo, the objective lens deviation in the tracking direction is controlled as nearly as possible to mechanical center, so that tracking servo work stably.

2-6-1. Disc Motor Servo Circuit

The servo circuit is kicked when the disc starts rotating. This kick is performed when IC401 pin ⑦ input (CLV) goes low. It goes high once in run-up mode, and after run-up, goes low again. When the servo circuit is kicked and the disc rotates, VS goes low and Q403 turns off. A data pulse, as shown in Fig. 13①, is input to Q203. The rotation speed of the disc is still slow at this time, and the longest intervals of the sync signals in the data are longer than normal value 11T. This pulse is changed to a sawtooth wave by Q203, R244 and C218 as shown in Fig. 13 ②. The peak of this sawtooth wave corresponds to the length of the pulse intervals in Fig. 13 ①. The longer the interval, the higher the peak. After this the highest value of this sawtooth wave is held by the IC203(A), D201, C219 peak hold circuit and it is changed to DC. Therefore this DC voltage is determined by the sawtooth wave peak value of the longest sync signals in the data. This voltage must be lowered as the disc rotation speed becames faster, so there is a discharge resistor, R245. The voltage which was peak held is bottom at IC203(B). This is to prevent the voltage from rising even if data interval which is longer than sync signal enters momentarily because of data drop-out. The voltage obtained in this way is compared with the voltage set at RV402 by IC402(A), and the servo the signal is obtained. RV402 is set so that IC402(A) output is about 3V


D201
ISS119
data input
R242
2.2k
R243
1k
Q203
R244
27k
(1%)
C218
180p/100V
C221
33/10V
IC203
(1/2)
(A)
D201
C219
0.0047
100V
R245
1M
IC202
(1/2)
C220
33
10V
IC203
(1/2)
(B)
D202
D202
ISS119
IC203 LF353N
BOTTOM HOLD
D402
ISS119
R419
10k
R493
15k
Q416
TP18
R420
3.9k
R421
4.7k
C408
0.1
Q416
2SA1026-7
SWITCH
R403
22k
Q402
R402
6.8k
RV401
100k
R404
10k
R407
120k
(1%)
R405
10k
R406
68k
C401
0.01
100V
C404
1/50V
IC401
COMPARATOR
SAMPLE
HOLD
C402
0.033
C403
0.01
from VS
IC301 pin ⑱
to DISC-STOP
IC301 pin ㉛
from BRAKE
IC301 pin ⑲
from CLV
IC301 pin ⑰

2-6-1. Disc Motor Servo Circuit

The servo circuit is kicked when the disc starts rotating. This kick is performed when IC401 pin ⑦ input (CLV) goes low. It goes high once in run-up mode, and after run-up, goes low again. When the servo circuit is kicked and the disc rotates, VS goes low and Q403 turns off. A data pulse, as shown in Fig. 13①, is input to Q203. The rotation speed of the disc is still slow at this time, and the longest intervals of the sync signals in the data are longer than normal value 11T. This pulse is changed to a sawtooth wave by Q203, R244 and C218 as shown in Fig. 13 ②. The peak of this sawtooth wave corresponds to the length of the pulse intervals in Fig. 13 ①. The longer the interval, the higher the peak. After this the highest value of this sawtooth wave is held by the IC203(A), D201, C219 peak hold circuit and it is changed to DC. Therefore this DC voltage is determined by the sawtooth wave peak value of the longest sync signals in the data. This voltage must be lowered as the disc rotation speed becames faster, so there is a discharge resistor, R245. The voltage which was peak held is bottom at IC203(B). This is to prevent the voltage from rising even if data interval which is longer than sync signal enters momentarily because of data drop-out. The voltage obtained in this way is compared with the voltage set at RV402 by IC402(A), and the servo the signal is obtained. RV402 is set so that IC402(A) output is about 3V when the disc is rotating at the prescribed speed. When the disc is run-up and rotating at this speed, the set can read the data, so 1/8 WFCK is input to IC401 pin ⑧. Also, VS goes high and the run-up circuit mentioned above is cut off from the servo system, and servo is applied by IC401.
The Q416 is a circuit which detects disc stop.
When IC301 pin ⑰ goes high, and IC401 is in STOP mode, the disc motor is braked. This happens because IC401 pin ⑤ goes low and pin ⑥ goes high. Then IC401 pin ⑧ input frequency becomes less than 1/8 of normal and brake is automatically released. However, on this model, a 1/8 WFCK is input here. 1/8 WFCK is obtained by frquency dividing the PLCK obtained from VCO. Therefore, even when the disc rotation decreases, VCO is oscillating at free run frequency, so 1/8 WFCK frequency does not drop. Therefore, unless IC401 pin ⑧ input is cut, the disc will begin reverse rotation. So, Q416 detects disc rotation stop, turn on Q402, shunts 1/8 WFCK and releases the brake.
When disc rotation stops, the input pulse to Q203 ceases, so IC203(A) output rises to the maximum value. This output passes through IC202 and is compared with set voltage at Q416 and Q416 collector goes low.
Through this, IC301 is informed that disc rotation has stopped and makes pin ⑲ (BRAKE) high. This output turns on Q402 so WFCK 1/8 is shunted and IC401 brake mode is released.

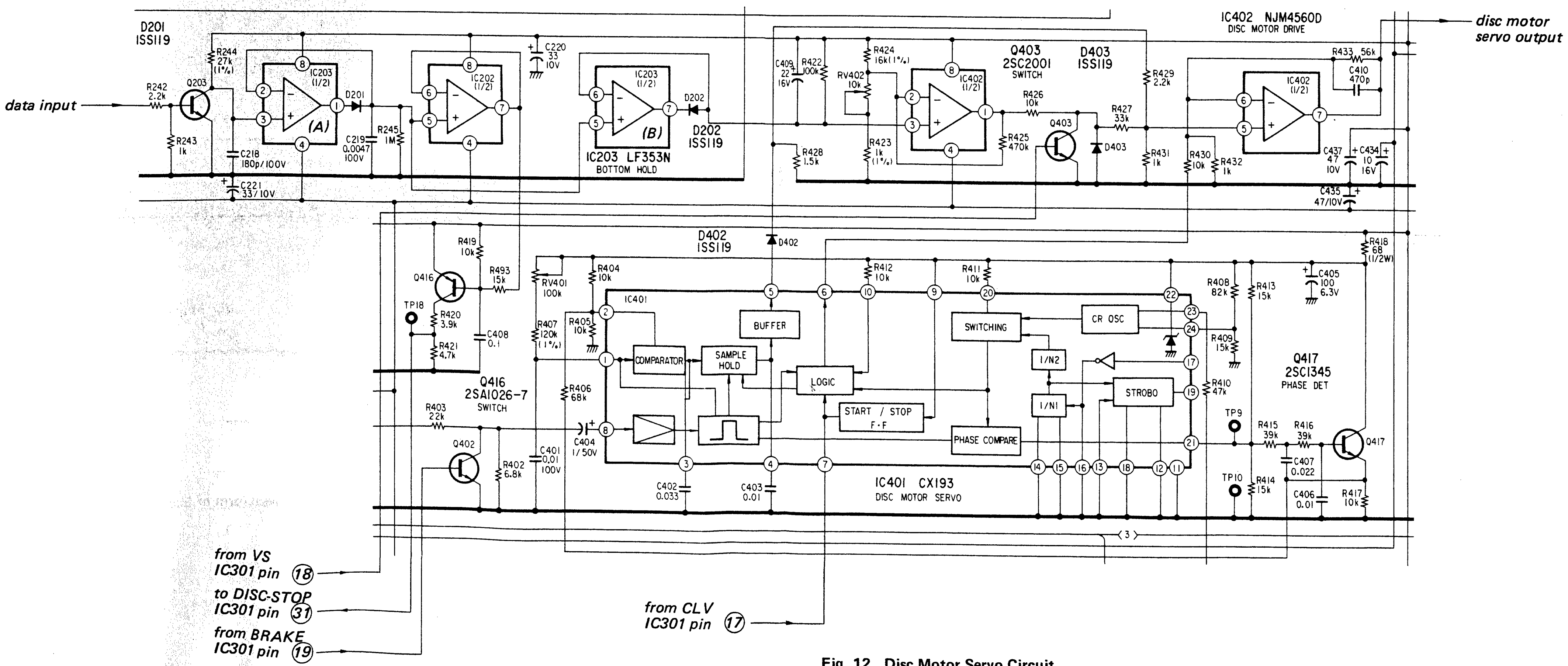

data input
D201 ISS119
R242 2.2k
Q203
R243 1k
R244 27k (1%)
IC203 (1/2)
(A)
D201
C218 180p/100V
C219 0.0047 100V
R245 1M
C221 33/10V
IC202 (1/2)
C220 33 10V
IC203 (1/2)
(B)
D202
D202 ISS119
IC203 LF353N BOTTOM HOLD
C409 22 16V
R422 100k
R424 16k (1%)
RV402 10k
R428 1.5k
R423 1k (1%)
IC402 (1/2)
R425 470k
Q403 2SC2001 SWITCH
D403 ISS119
R426 10k
Q403
R427 33k
D403
R429 2.2k
R431 1k
R430 10k
R432 1k
IC402 NJM4560D DISC MOTOR DRIVE
R433 56k
C410 470p
IC402 (1/2)
C437 47 10V
C434 10 16V
C435 47/10V
disc motor servo output
D402 ISS119
D402
R419 10k
Q416
TP18
R420 3.9k
R421 4.7k
R493 15k
C408 0.1
Q416 2SA1026-7 SWITCH
R403 22k
Q402
R402 6.8k
RV401 100k
R407 120k (1%)
R405 10k
R404 10k
R406 68k
C401 0.01 100V
C404 1/50V
IC401
COMPARATOR
SAMPLE HOLD
BUFFER
LOGIC
START / STOP F·F
PHASE COMPARE
SWITCHING
CR OSC
1/N2
1/N1
STROBO
R412 10k
R411 10k
C402 0.033
C403 0.01
IC401 CX193 DISC MOTOR SERVO
R408 82k
R413 15k
C405 100 6.3V
R418 68 (1/2W)
R409 15k
R410 47k
Q417 2SC1345 PHASE DET
TP9
R415 39k
R416 39k
C407 0.022
Q417
TP10
R414 15k
C406 0.01
R417 10k
from VS IC301 pin ⑱
to DISC-STOP IC301 pin ㉛
from BRAKE IC301 pin ⑲
from CLV IC301 pin ⑰

Fig. 12 Disc Motor Servo Circuit

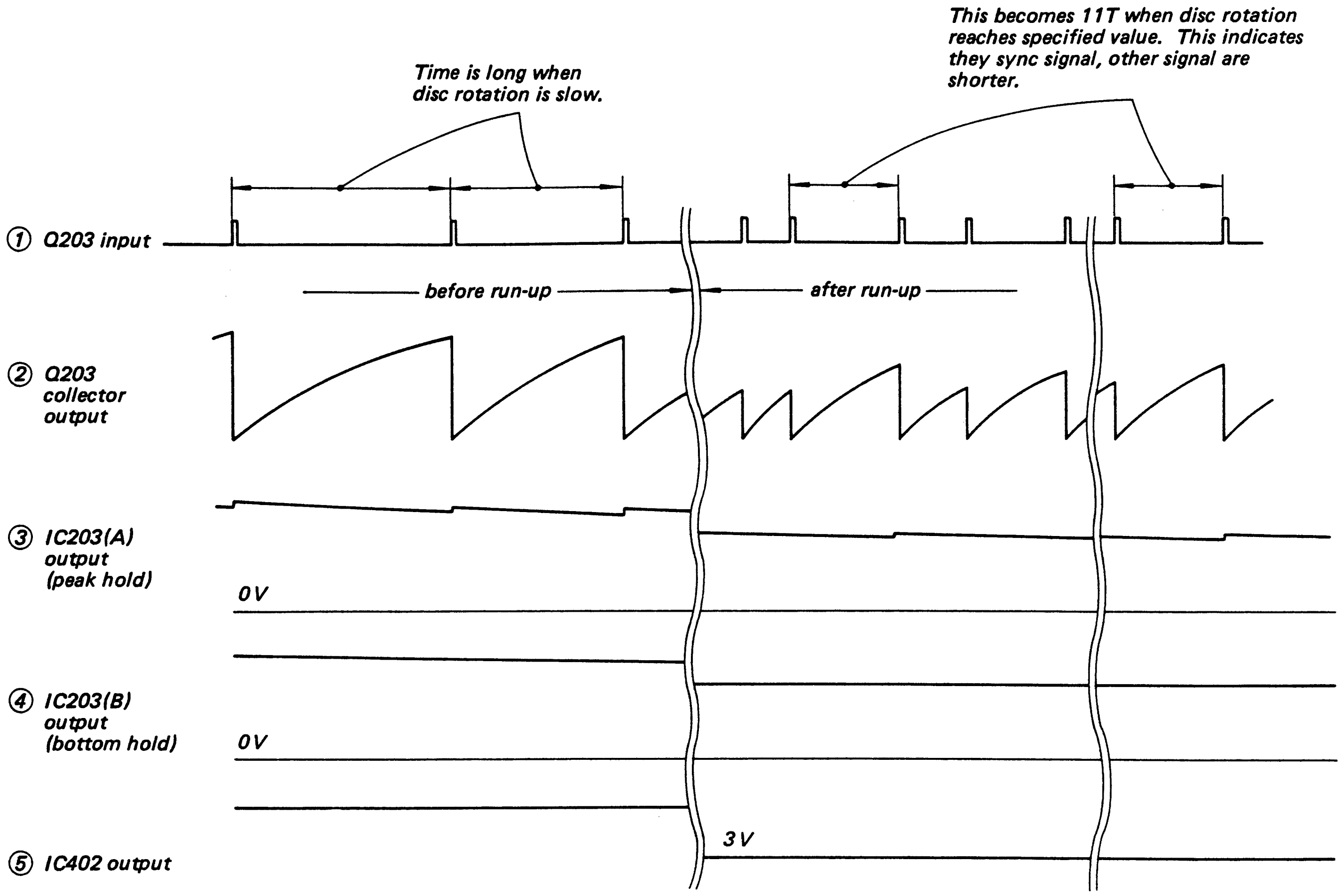

This becomes 11T when disc rotation reaches specified value. This indicates they sync signal, other signal are shorter.
Time is long when disc rotation is slow.
① Q203 input
before run-up
after run-up
② Q203 collector output
③ IC203(A) output (peak hold)
0V
④ IC203(B) output (bottom hold)
0V
3V
⑤ IC402 output

Fig. 13 CLVS Circuit Waveform

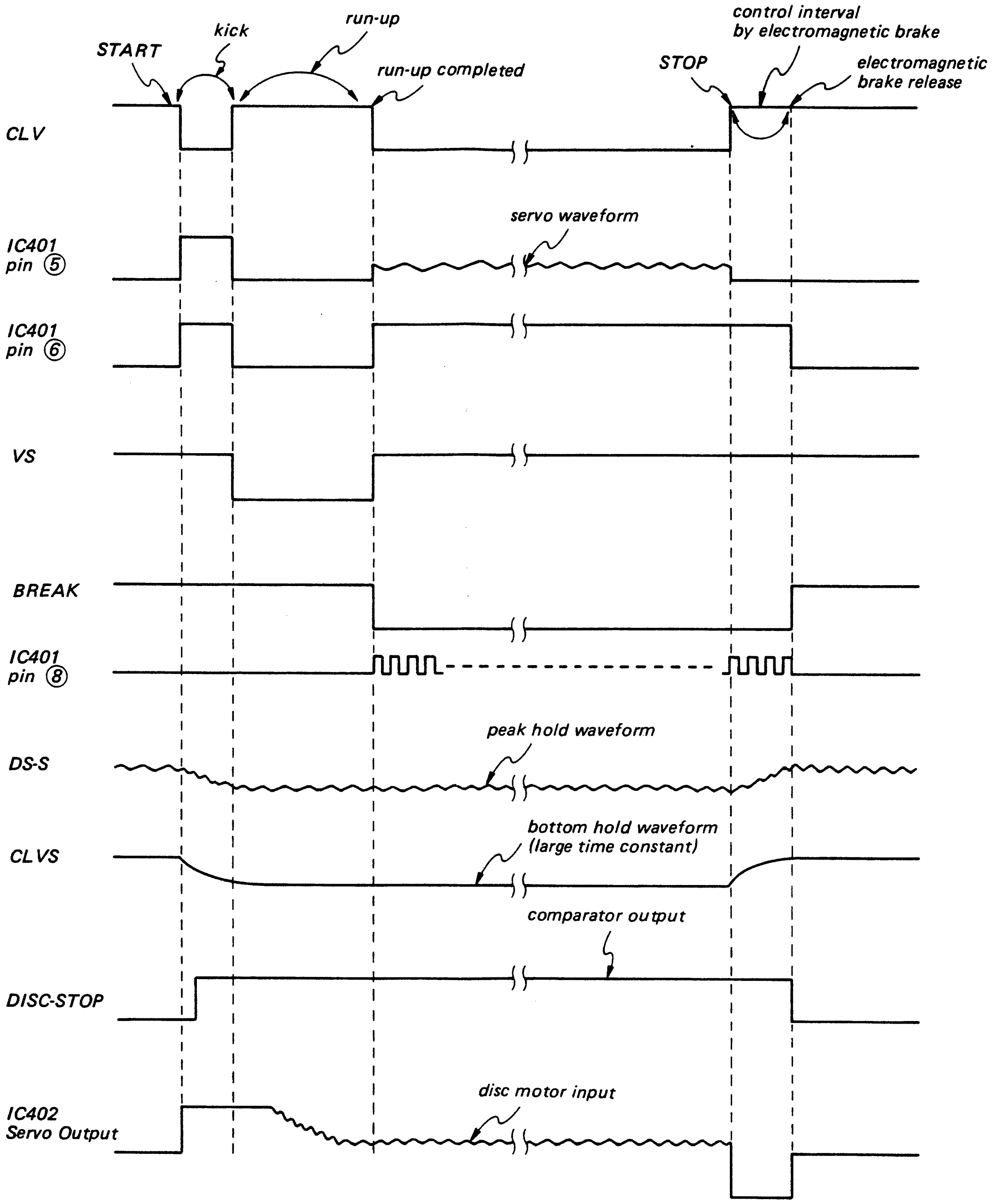

START
kick
run-up
run-up completed
STOP
control interval by electromagnetic brake
electromagnetic brake release
CLV
IC401 pin ⑤
servo waveform
IC401 pin ⑥
VS
BREAK
IC401 pin ⑧
DS-S
peak hold waveform
CLVS
bottom hold waveform (large time constant)
comparator output
DISC-STOP
disc motor input
IC402 Servo Output

Fig. 14 Waveform of Each Section

2-6-2. Focus Error Amp

The main spot detector is divided into A,B,C and D. The output of these detectors are obtained as (A+C) and (B+D) and used for the focus servo. For data read-out, these two are added again and used as (A+B+C+D).
The (A+C), (B+D) detector outputs are amplified by IC101,and is then compared at IC102.
This output is (A+C)-(B+D), and is focus error voltage.

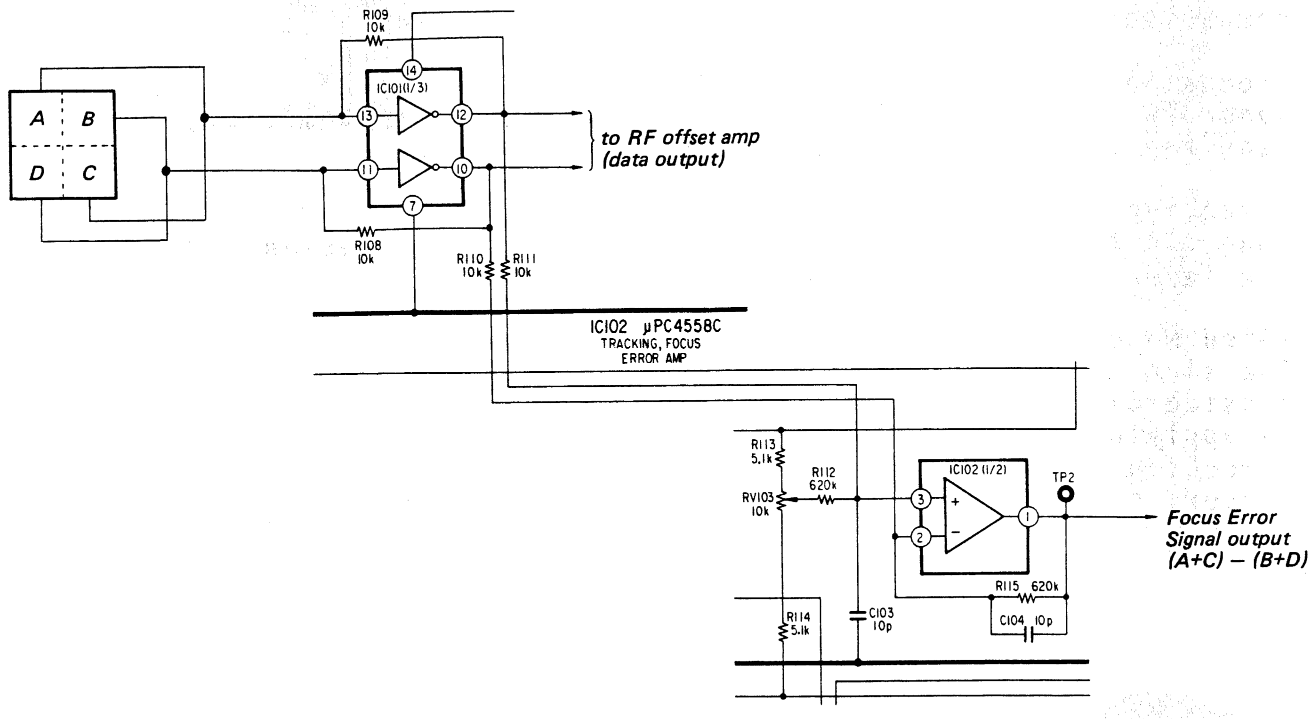
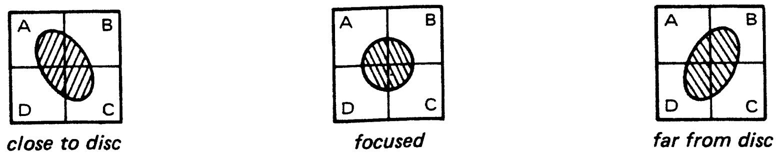

A
B
D
C
R109 10k
IC101(1/3)
R108 10k
R110 10k
R111 10k
to RF offset amp (data output)
IC102 µPC4558C TRACKING, FOCUS ERROR AMP
R113 5.1k
RV103 10k
R112 620k
IC102 (1/2)
TP2
Focus Error Signal output (A+C) − (B+D)
R115 620k
C104 10p
R114 5.1k
C103 10p

Fig. 15 Focus Error Amp

RV103 is the focus adjustment control and is adjusted so that eye pattern (data output pattern) is correct possible.
Generally, the eye pattern is best at the maximum output point.
However, this may vary depending on detector irregularity or TOP mis-adjustment. Therefore the eye pattern is observed for focus adjustment.



close to disc

focused

far from disc

Fig. 16 Laser Spot and Detector

2-6-3. Focus Servo Circuit

When the disc is loaded in the set, first focus search is performed and focus servo is applied.
Focus search is performed by output of a low focus search pulse from IC301 pin ㉒ . This focus search pulse is applied to the bases of Q405 and Q406, turning Q405 on and Q406 off. When Q405 goes ON, the potential at point Ⓐ rises slowly. Aloso, because Q406 goes OFF, point Ⓐ potential is applied to IC406 ⊕ input. Therfore the 2-axis device according to point Ⓐ voltage change. When the height of the 2-axis device reaches the exact focus position, focus servo (F•S) goes low, and Q407, which was ON, goes OFF. Exact focus detection is performed by the focus OK circuit and focus zero cross detection circuit. When Q407 goes OFF, the focus error (F•E) signal is input to IC406, so focus servo begins to operate. When this servo does not operate with one focus serach pulse, this opration is repeated twice more. When the servo does not work even after the third time this is an error, the set stops and the disc ejected.

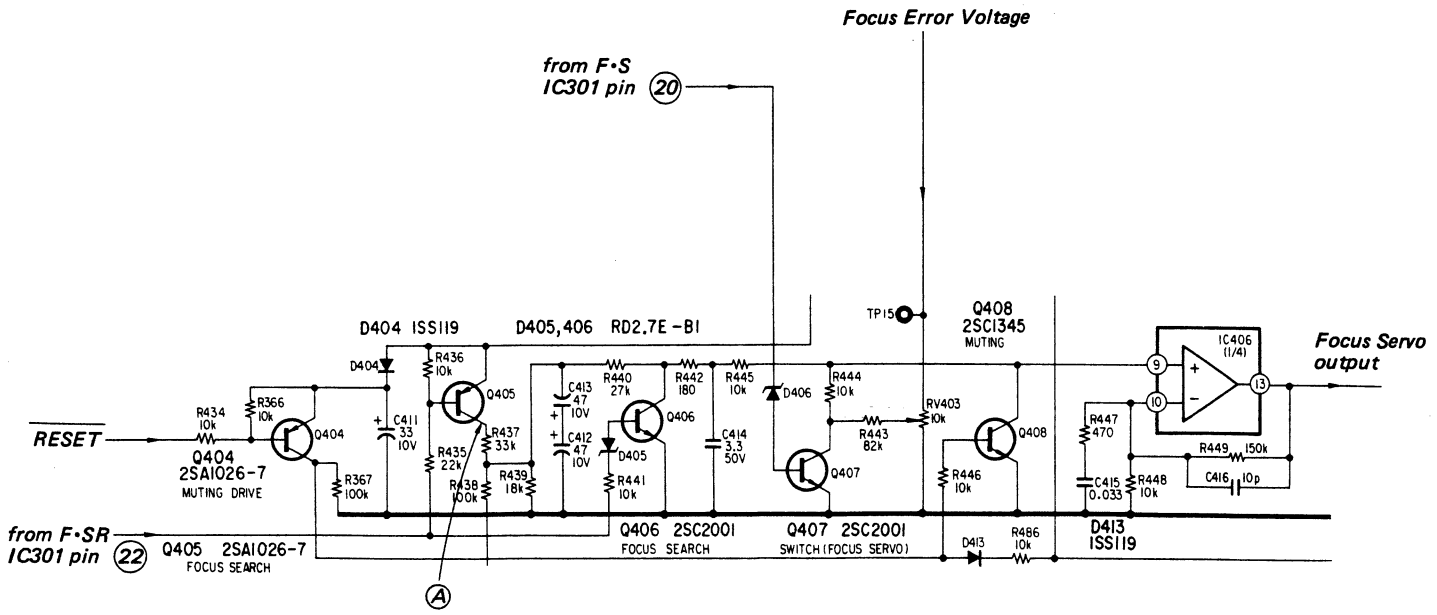

Focus Error Voltage
from F•S IC301 pin ⑳
RESET
from F•SR IC301 pin ㉒
D404 ISS119
D405,406 RD2.7E-BI
TP15
Q408 2SC1345 MUTING
IC406 (1/4)
Focus Servo output
R434 10k
R366 10k
Q404 2SA1026-7 MUTING DRIVE
R367 100k
C411 33 10V
R436 10k
R435 22k
R437 33k
R438 100k
R439 18k
C413 47 10V
C412 47 10V
R440 27k
R442 180
R445 10k
D405
D406
R441 10k
C414 3.3 50V
R444 10k
R443 82k
RV403 10k
R446 10k
R447 470
C415 0.033
R448 10k
R449 150k
C416 10p
Q405 2SA1026-7 FOCUS SEARCH
Q406 2SC2001 FOCUS SEARCH
Q407 2SC2001 SWITCH (FOCUS SERVO)
D413
R486 10k
D413 ISS119
Ⓐ

Fig. 17 Focus Servo Circuit

2-6-4. Tracking Error Amp

The output from tracking detectors E and F are amplified by inverters (IC101), then are input to IC102 operation amp. The difference between E and F output is amplified at IC202 and error signal is obtained.

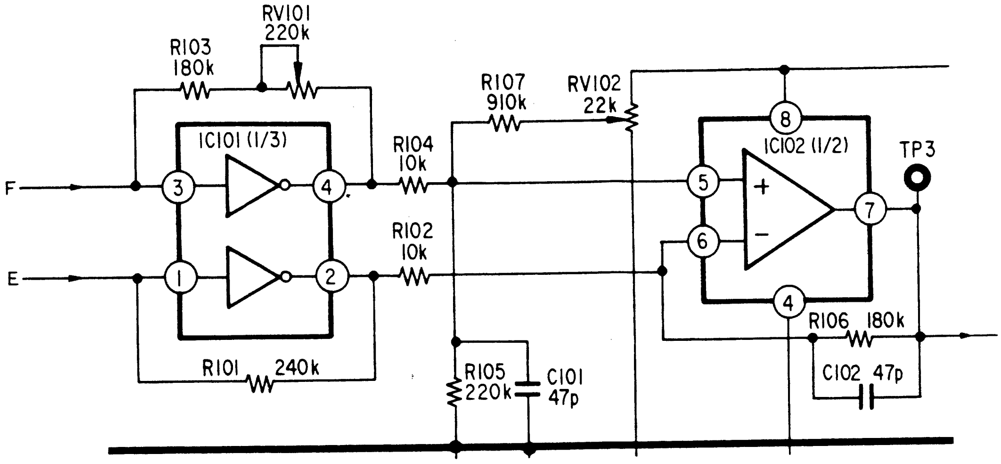

RV101
220k
R103
180k
R107
910k
RV102
22k
IC101 (1/3)
R104
10k
IC102 (1/2)
TP3
F
3
4
5
+
7
−
6
R102
10k
E
1
2
4
R106 180k
R101 240k
R105
220k
C101
47p
C102 47p
8

Fig. 18 Tracking Error Amp

RV102 is the DC offset control for IC102, and is adjusted so that output is 0V DC in STOP mode. RV101 is the control for matching E/F output levels. Adjustment is done in PLAY mode, with tracking servo stopped, by Fig. 19.
This traverse signal is generated by the laser beam cutting across the track.

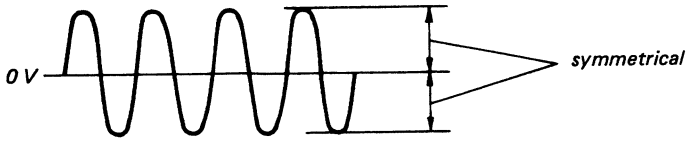

0 V
symmetrical

Fig. 19 Traverse Signal

2-6-5. Tracking Servo

The trcking error signal passes through RV404, is amplified at IC403(A), continues through IC406 and drives the 2-axis device. Q410, 411 are for servo amp gain switching and are normally ON. Gain rises when they go OFF. Gain is raised during access, or when tracking becomes unstable due to set vibration,etc. When $\overline{\text{TGU}}$ goes low during access or when tracking becomes unstable, Q415 goes ON and turns off Q401, 411. Unstable tracking is detected by input of tracking error voltage to the comparator (IC405).
When track jump, IC301 pin ⑪ , ⑫ are output the track-jump signal. It pass through IC403(B) and is controlled track-jump.

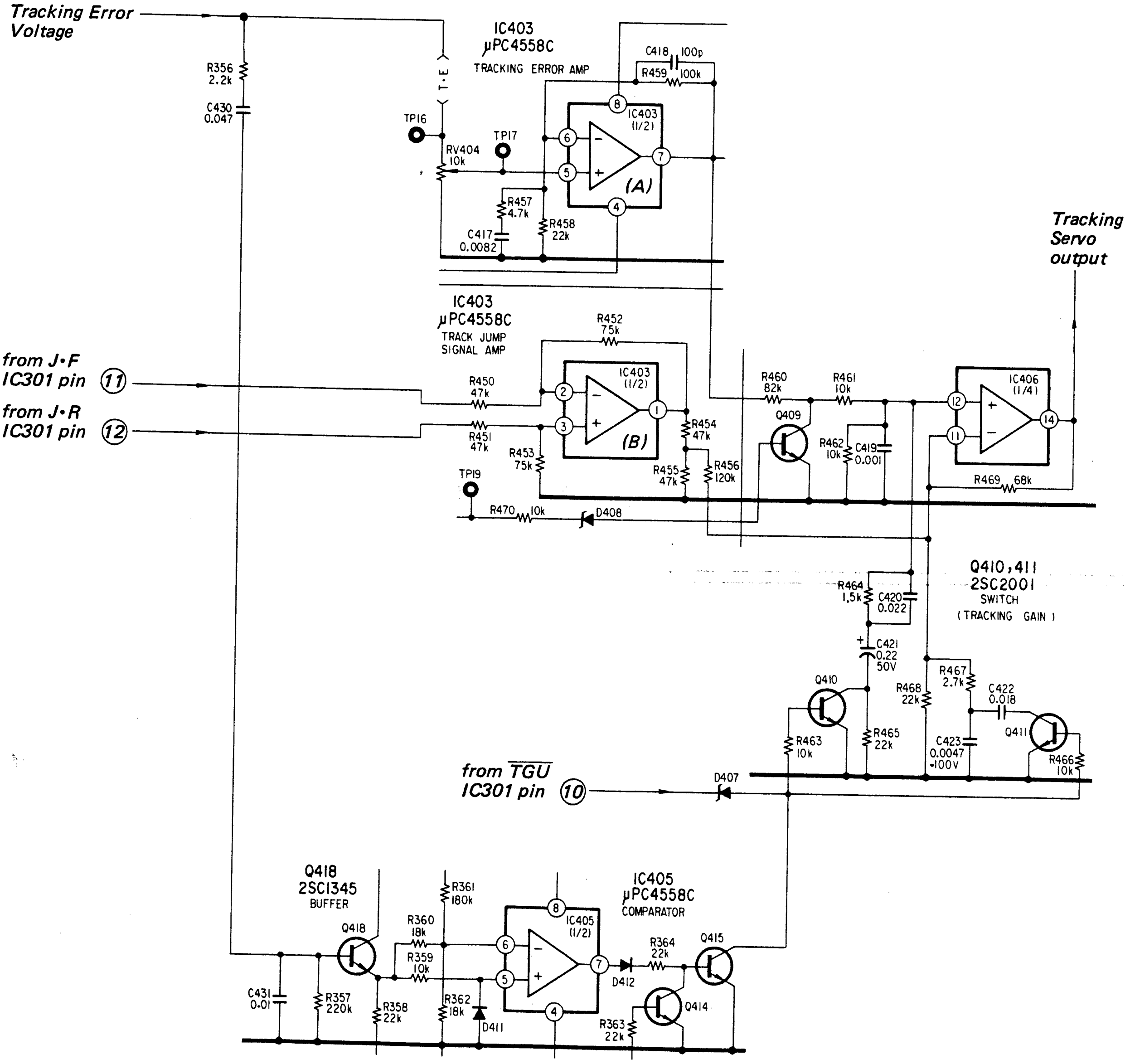
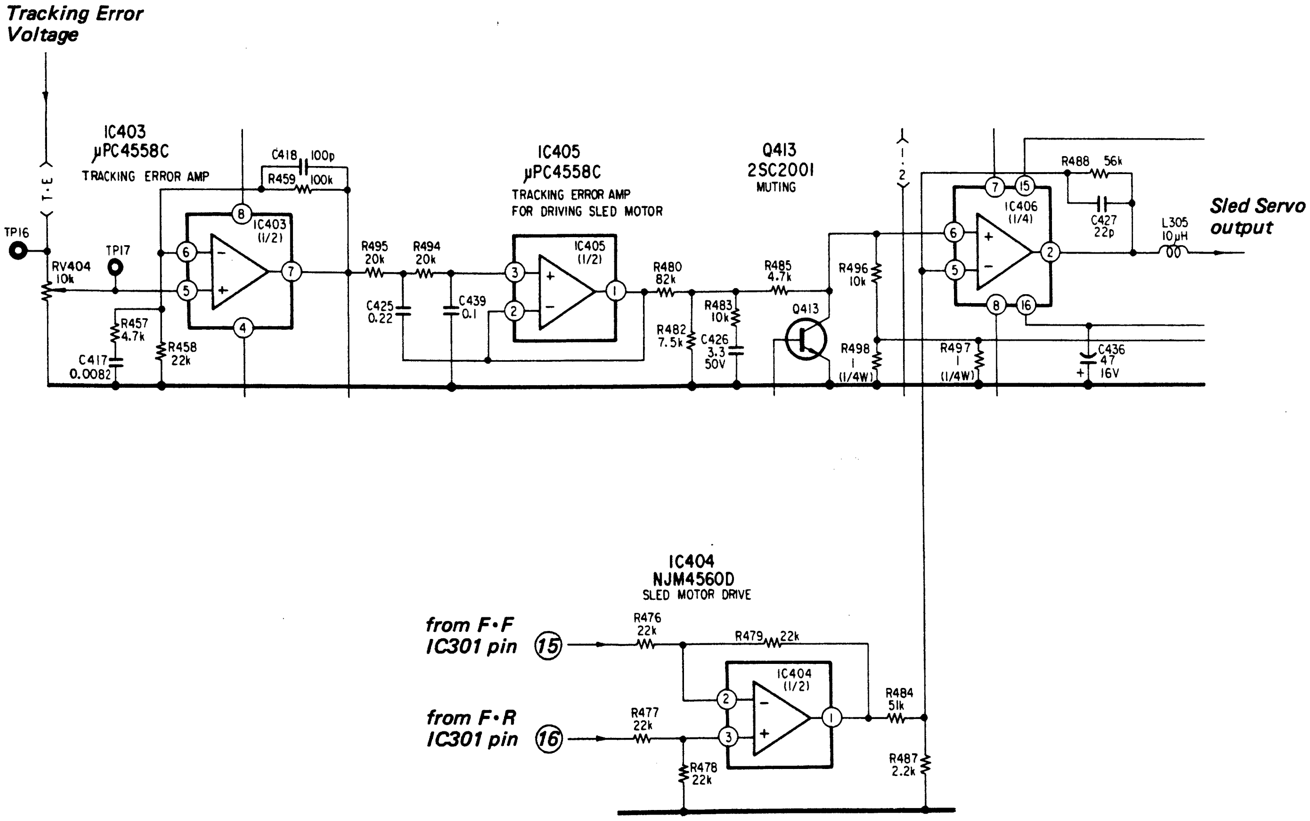

Tracking Error Voltage
R356 2.2k
C430 0.047
T.E
IC403 μPC4558C TRACKING ERROR AMP
C418 100p
R459 100k
IC403 (1/2)
(A)
TP16
TP17
RV404 10k
R457 4.7k
R458 22k
C417 0.0082
Tracking Servo output
IC403 μPC4558C TRACK JUMP SIGNAL AMP
R452 75k
from J•F IC301 pin ⑪
from J•R IC301 pin ⑫
R450 47k
R451 47k
IC403 (1/2)
(B)
R453 75k
R454 47k
R455 47k
R456 120k
TP19
R470 10k
D408
R460 82k
R461 10k
Q409
R462 10k
C419 0.001
IC406 (1/4)
R469 68k
Q410,411 2SC2001 SWITCH (TRACKING GAIN)
R464 1.5k
C420 0.022
C421 0.22 50V
Q410
R463 10k
R465 22k
R468 22k
R467 2.7k
C422 0.018
C423 0.0047 100V
Q411
R466 10k
from $\overline{TGU}$ IC301 pin ⑩
D407
Q418 2SC1345 BUFFER
Q418
R361 180k
R360 18k
R359 10k
IC405 (1/2)
IC405 μPC4558C COMPARATOR
R364 22k
Q415
D412
Q414
R363 22k
C431 0.01
R357 220k
R358 22k
R362 18k
D411

Fig. 20 Tracking Servo Circuit

2-6-6. Sled Motor Servo

The sled motor is also driven by tracking error voltage. However, when the tracking servo is at a relatively fast speed in accordance with disc rotation, sled motor rotation speed progresses in large step. The tracking error signal amplified at IC403 has its high frequency component removed at low pass filer (IC405).
Q413 is a transistor for sled servo ON/OFF and is only off during PLAY, to operate the sled motor.
Also, during track jump on F•F or F•R signal is input to this circuit, to operate the sled motor, separately from servo operation by tracking error voltage. F•F, F•R signals pass IC404, input to IC406 and operate the sled motor.
The F•R signal is also output when play is interrupted by RESET switch and the 2-axis device is returned to its starting position.



Tracking Error Voltage
T.E
TP16
RV404 10k
TP17
IC403 μPC4558C
TRACKING ERROR AMP
C418 100p
R459 100k
IC403 (1/2)
R457 4.7k
C417 0.0082
R458 22k
R495 20k
R494 20k
C425 0.22
C439 0.1
IC405 μPC4558C
TRACKING ERROR AMP FOR DRIVING SLED MOTOR
IC405 (1/2)
R480 82k
R483 10k
R482 7.5k
C426 3.3 50V
Q413 2SC2001
MUTING
R485 4.7k
Q413
R496 10k
R498 1 (1/4W)
1-2
R488 56k
IC406 (1/4)
C427 22p
L305 10μH
Sled Servo output
R497 1 (1/4W)
C436 47 16V
IC404 NJM4560D
SLED MOTOR DRIVE
from F•F IC301 pin ⑮
R476 22k
R479 22k
IC404 (1/2)
from F•R IC301 pin ⑯
R477 22k
R478 22k
R484 51k
R487 2.2k

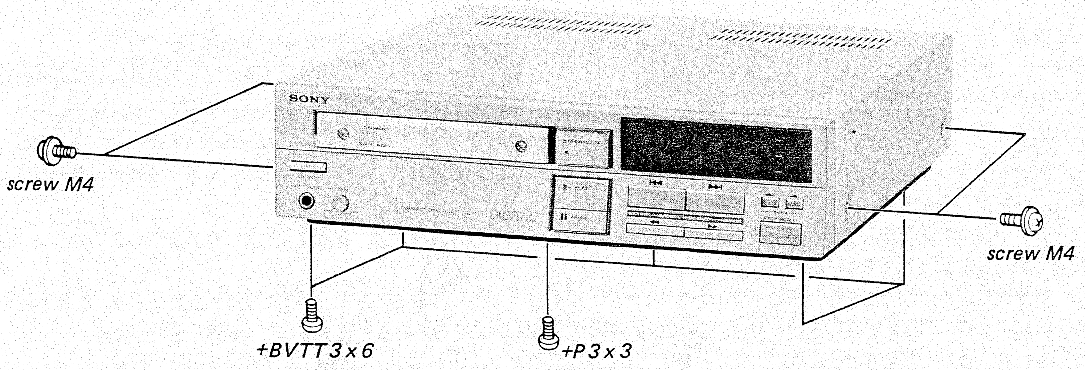
Fig. 21 Sled Motor Servo Circuit

SECTION 3
DISASSEMBLY

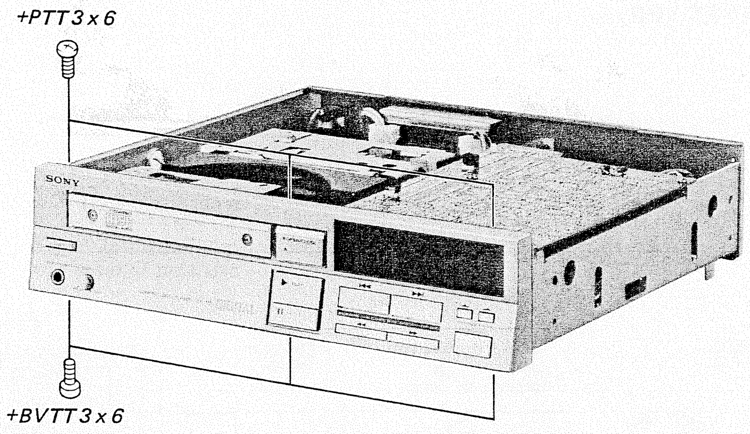
3-1. DISASSEMBLY

Note: Follow the disassembly procedure in the numerical order given.

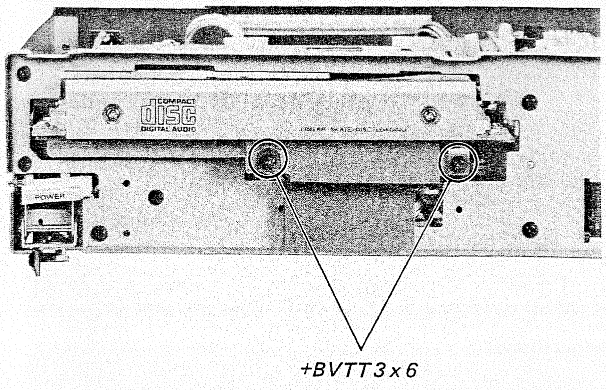
CASE, BOTTOM PLATE

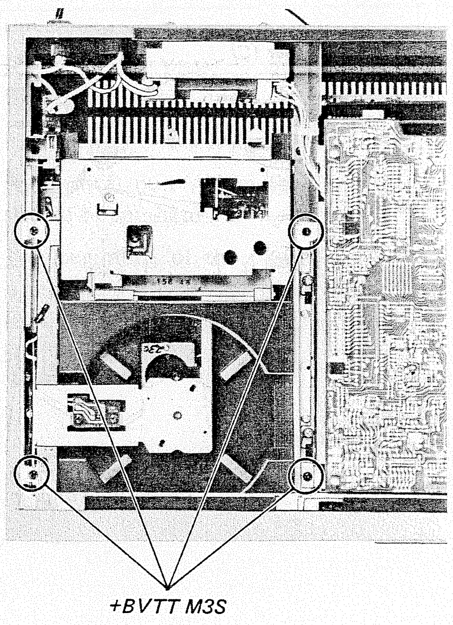

screw M4
screw M4
+BVTT3x6
+P3x3

FRONT PANEL

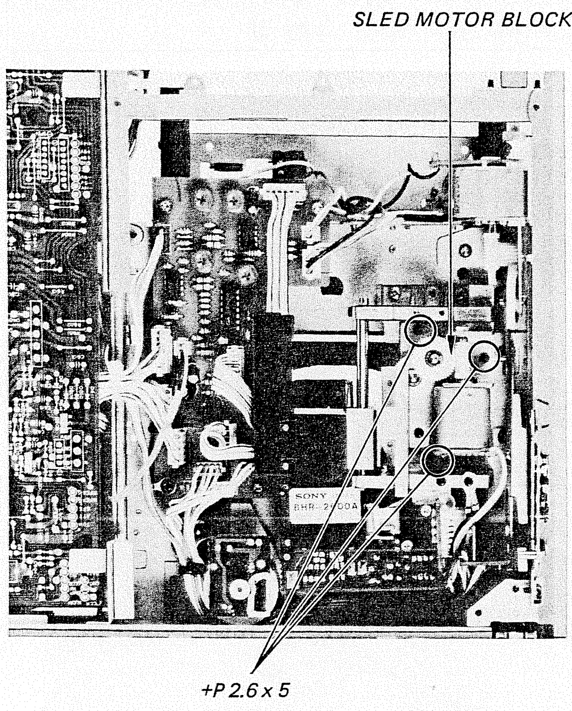

+PTT3x6
+BVTT3x6

MECHANISM SECTION

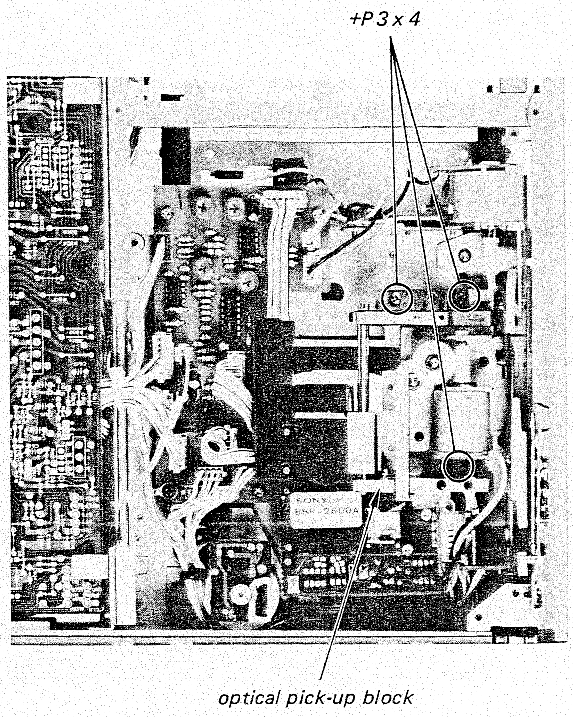




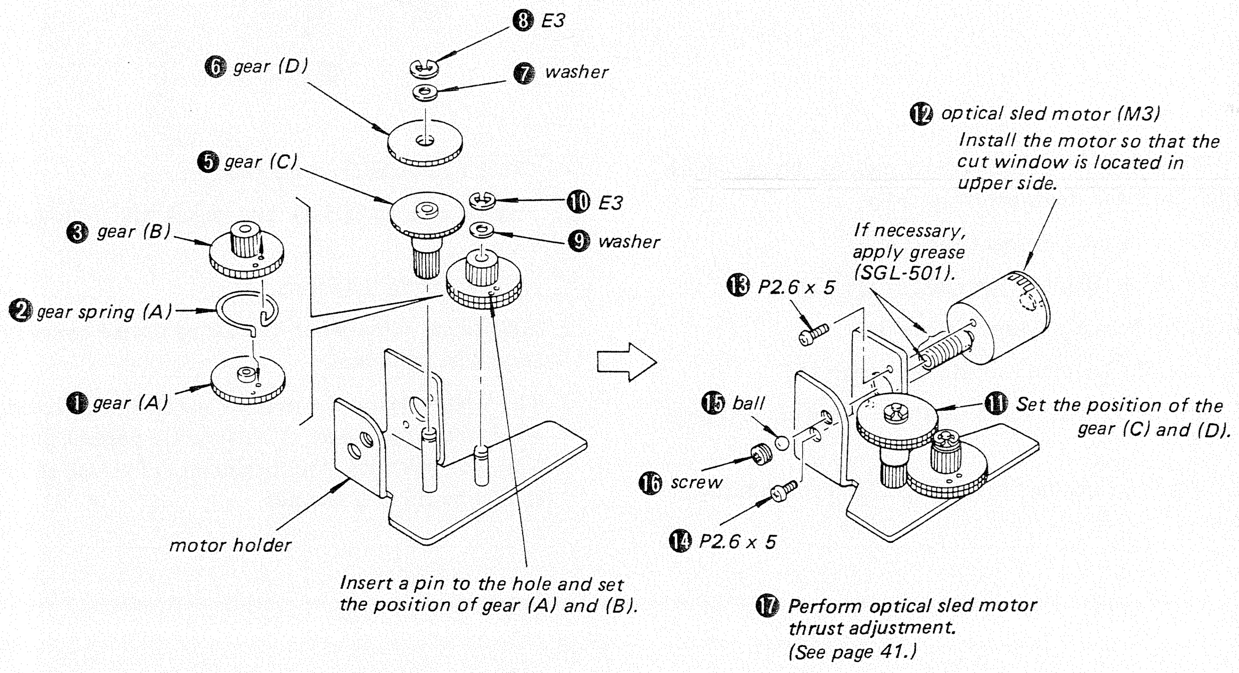
SLED MOTOR BLOCK


SLED MOTOR BLOCK
SONY
BHR-2600A
+P 2.6 x 5

OPTICAL PICK-UP BLOCK


+P 3 x 4
SONY
BHR-2600A
optical pick-up block

OPTICAL SLED MOTOR ASSEMBLY


❽ E3
❻ gear (D)
❼ washer
❺ gear (C)
❿ E3
❾ washer
❸ gear (B)
❷ gear spring (A)
❶ gear (A)
motor holder
⓬ optical sled motor (M3)
⓭ P2.6 x 5
⓯ ball
⓰ screw
⓮ P2.6 x 5
⓫

Install the motor so that the cut window is located in upper side.

If necessary, apply grease (SGL-501).

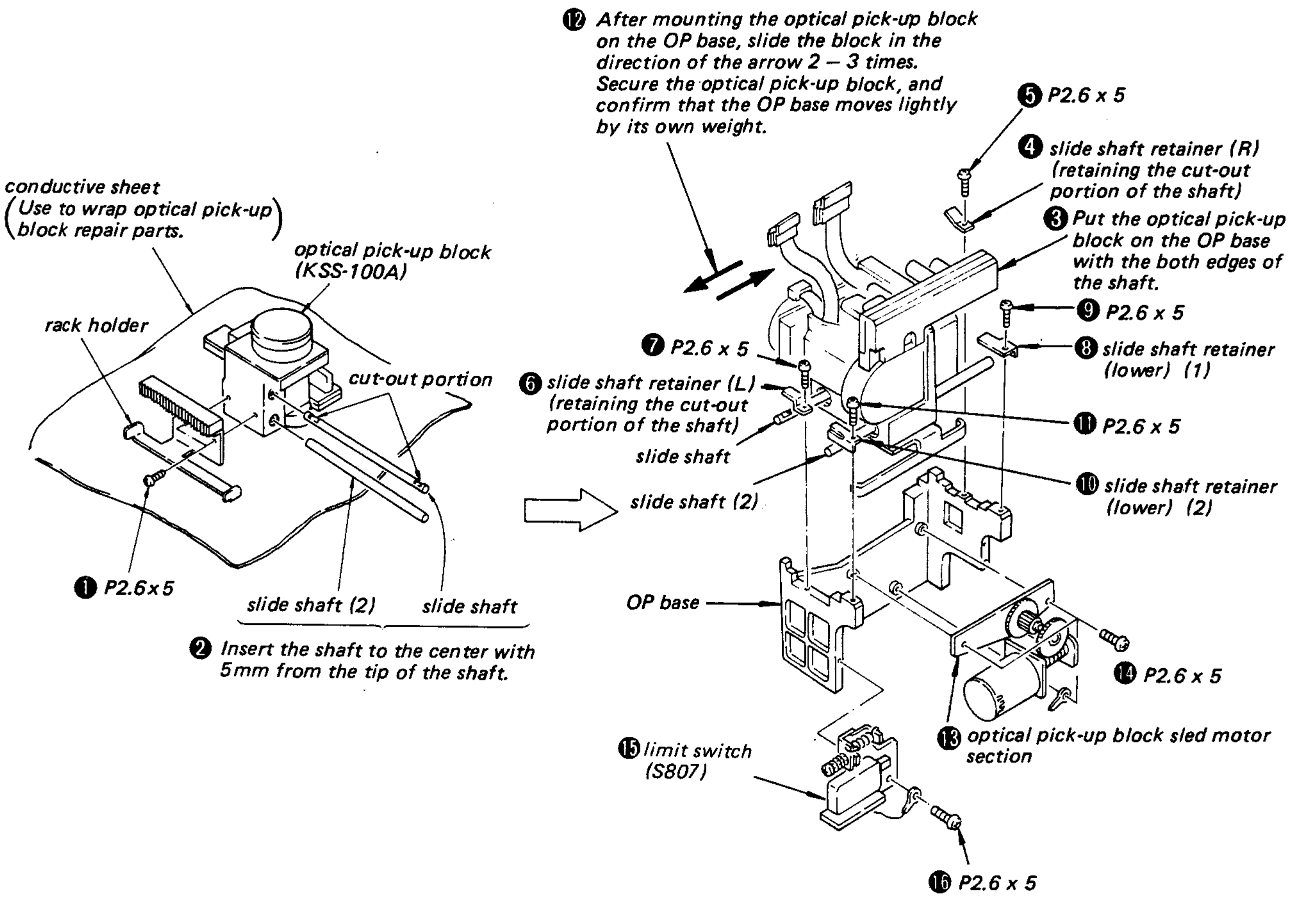
⓫ Set the position of the gear (C) and (D).

Insert a pin to the hole and set the position of gear (A) and (B).

⓱ Perform optical sled motor thrust adjustment. (See page 41.)

OPTICAL PICK-UP BLOCK ASSEMBLY

Refer to the Note on Handling the Optical Pick-up Block (KSS-100A). (page 6)



⑫ *After mounting the optical pick-up block on the OP base, slide the block in the direction of the arrow 2 – 3 times. Secure the optical pick-up block, and confirm that the OP base moves lightly by its own weight.*

③ *Put the optical pick-up block on the OP base with the both edges of the shaft.*

② *Insert the shaft to the center with 5mm from the tip of the shaft.*

conductive sheet
(Use to wrap optical pick-up block repair parts.)
optical pick-up block (KSS-100A)
rack holder
cut-out portion
① P2.6x5
slide shaft (2)
slide shaft
⑤ P2.6 x 5
④ slide shaft retainer (R) (retaining the cut-out portion of the shaft)
⑨ P2.6 x 5
⑧ slide shaft retainer (lower) (1)
⑦ P2.6 x 5
⑥ slide shaft retainer (L) (retaining the cut-out portion of the shaft)
slide shaft
⑪ P2.6 x 5
slide shaft (2)
⑩ slide shaft retainer (lower) (2)
OP base
⑭ P2.6 x 5
⑬ optical pick-up block sled motor section
⑮ limit switch (S807)
⑯ P2.6 x 5

When replacing the optical pick-up block, check and adjust the items below in order.

1. RF Offset Adjustment (page 43)
2. Tracking Offset Adjustment (page 43)
3. Focus Bias Adjustment (page 44)
4. Tracking Balance Adjustment (page 45)
5. Optical Pick-up Block Position Adjustment (page 40)

After performing the above, confirm focus/tracking gain.

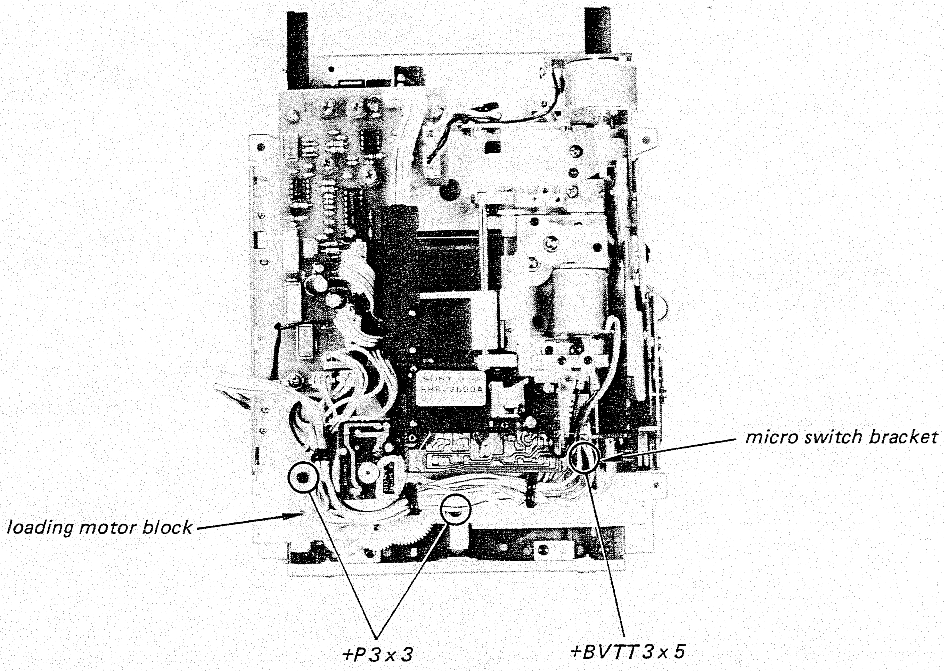
– **Checking Focus/Tracking Gain** –

Play a disc (YEDS-1) and check the following items.

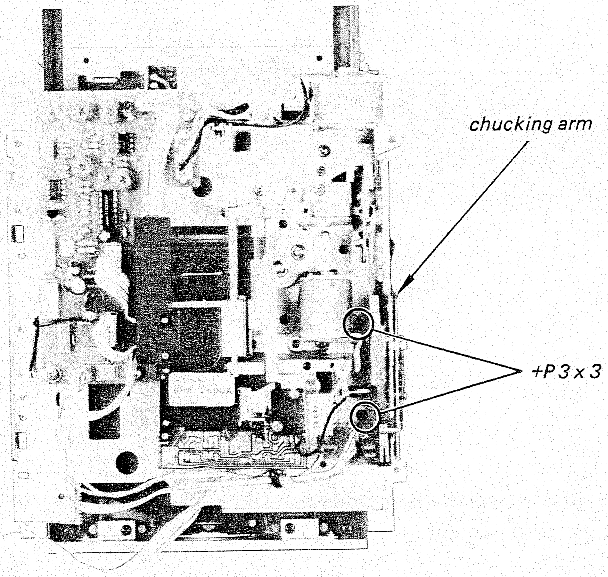
1. No skipping in the sound.
2. Mechanical noise when the 2-axis device operates should be minimum.
3. The beginning of the desired selection is reached when the (⏮ , ⏭) buttons are pressed. The time for reaching the beginning of a selection should be about 2 seconds.

Remove the mechanical section
(See page 35.)

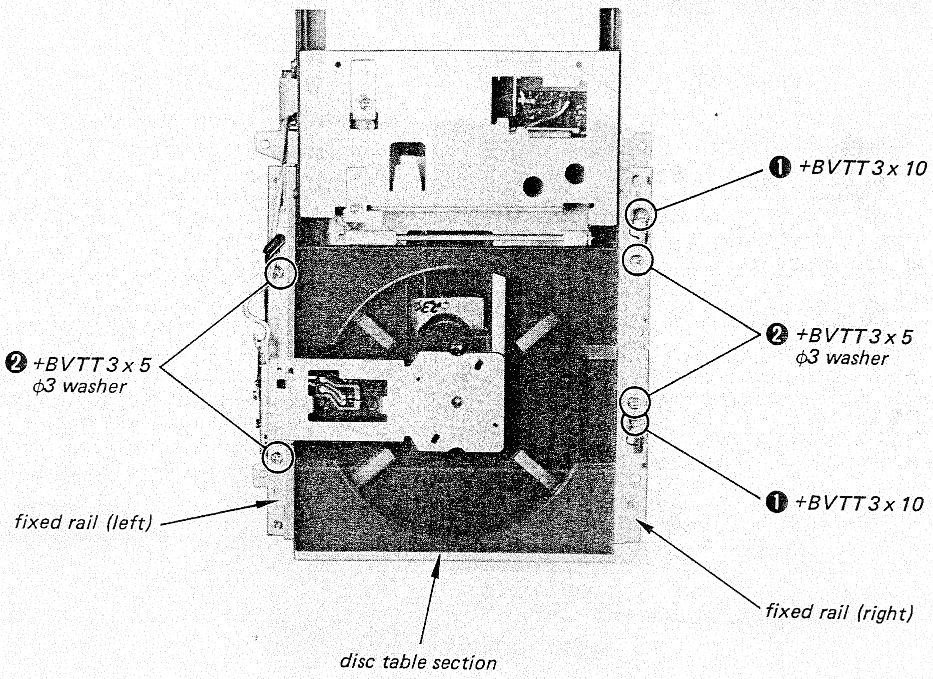
LOADING MOTOR BLOCK, MICRO SWITCH BRACKET


micro switch bracket
loading motor block
+P 3 x 3
+BVTT 3 x 5

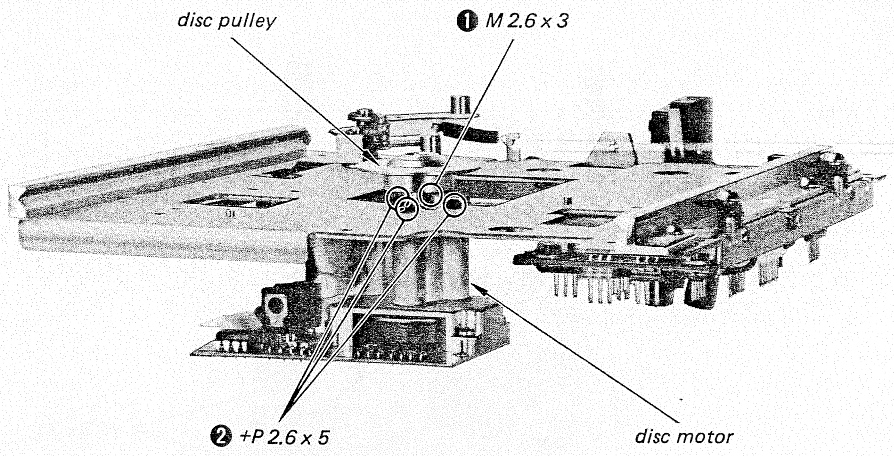
CHUCKING ARM


chucking arm
+P 3 x 3

FIXED RAIL (RIGHT) · (LEFT), DISC TABLE SECTION


❶ +BVTT3 x 10
❷ +BVTT3 x 5
φ3 washer
❷ +BVTT3 x 5
φ3 washer
❶ +BVTT3 x 10
fixed rail (left)
fixed rail (right)
disc table section

DISC PULLEY, DISC MOTOR


disc pulley
❶ M2.6 x 3
❷ +P2.6 x 5
disc motor

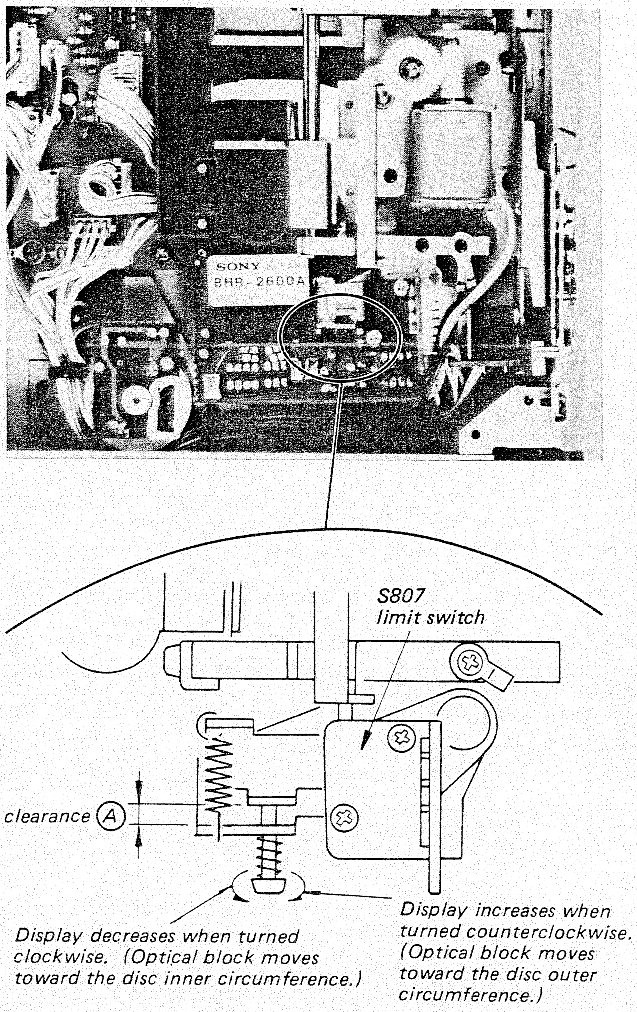
Note: After disc pulley is attached, perform the Disc Pulley Adjustment. (See page 41.)

SECTION 4
ADJUSTMENTS

4-1. MECHANISM ADJUSTMENTS

Optical Pick-up Position Adjustment

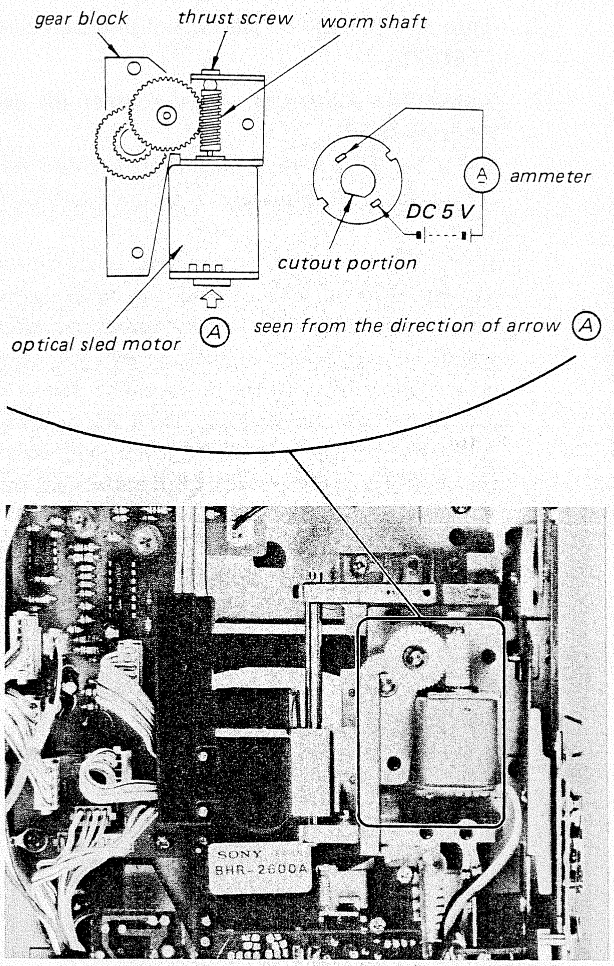
This adjustment determines the position when the optical block is at its innermost position on the disc. It is done so that the optical block can read the information recorded in the TOC (Table of Contents) on the disc lead-in track.


SONY
BHR-2600A
S807
limit switch
clearance Ⓐ
Display decreases when turned clockwise. (Optical block moves toward the disc inner circumference.)
Display increases when turned counterclockwise. (Optical block moves toward the disc outer circumference.)

Perform this adjustment after adjusting so that clearance Ⓐ is approximately 2.4 mm when the adjustment screw is removed.

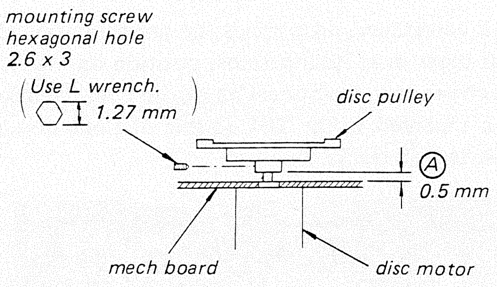
1. Turn the POWER switch on and insert the disc (YEDS-1).
2. Adjust the adjustment screw so that the set reads the TOC.
   When the TOC is read accurately, the disc will rotate for approximately 2 seconds and then stop.
   If the TOC is not read, more than 16 (there are 16 selections on YEDS-1) will not be displayed on the display window track number indicator when the auto selection button (▶▶I) is pressed continuously. If the adjustment screw is turned too far clockwise (optical block position is on the outer side), the TOC is not read, while the data after the first selection is read, and the display window time counter moves ahead.
   Also, if the adjustment screw is turned too far counterclockwise (optical block is on the inner side), limit switch S807 does not turn on and the optical block touches the OP base.
3. Press the OPEN/CLOSE button, and insert and take the disc out several times, and confirm that the TOC is read out.
4. Press the PLAY button.
   Press the auto selection button (▶▶I) and fast forward button (▶▶) and play the portion of the disc near the outer circumference. When this portion is being played, turn the POWER switch off. Then turn the POWER switch on again and confirm that the set reads the TOC at this time.

Optical Sled Motor Thrust Adjustment


gear block
thrust screw
worm shaft
Ⓐ ammeter
DC 5 V
cutout portion
optical sled motor
Ⓐ
seen from the direction of arrow Ⓐ
SONY
BHR-2600A

1. Remove gear block. (See page 36.)
2. Turn thrust screw counterclockwise to loosen.
3. Connect as shown above and remember the ammeter reading.
4. Next, turn the thrust screw clockwise slowly and adjust so that the ammeter reading is +1 mA from the reading in step 2.
5. Confirm that there is no worm shaft thrust play.
6. After adjustment, lock the screw.
7. Install the gear block. (See page 36.)

Disc Pulley Height Adjustent


mounting screw
hexagonal hole
2.6 x 3
(Use L wrench.
1.27 mm)
disc pulley
Ⓐ
0.5 mm
mech board
disc motor

Install the disc pulley so that clearance Ⓐ is 0.5 mm.

4-2. ELECTRICAL ADJUSTMENTS

1. Perform adjustments in the order given.
2. Use YEDS-1 disc unless otherwise indicated.

Adjustment Mode

1. Connect servo amp board test points TP11 and TP12.
2. Turn RV301 fully clockwise.

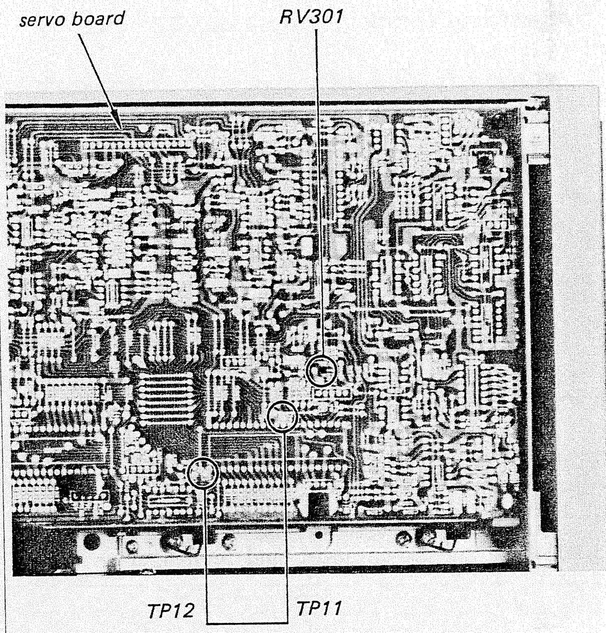
   (This is to prevent the disc table from opening even though pits are not read, by making microcomputer IC301 pin ㉝ low.)
3. Turn POWER switch on.
   (To reset microcomputer.)

Adjustment Mode:

Turn fully clockwise. ↻

Normality Mode:

Turn fully counterclockwise. ↺

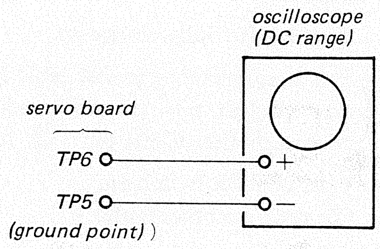


Connect TP12 and TP11

After adjustment, remove lead wire connecting TP11 and TP12, and turn RV301 fully counterclockwise.

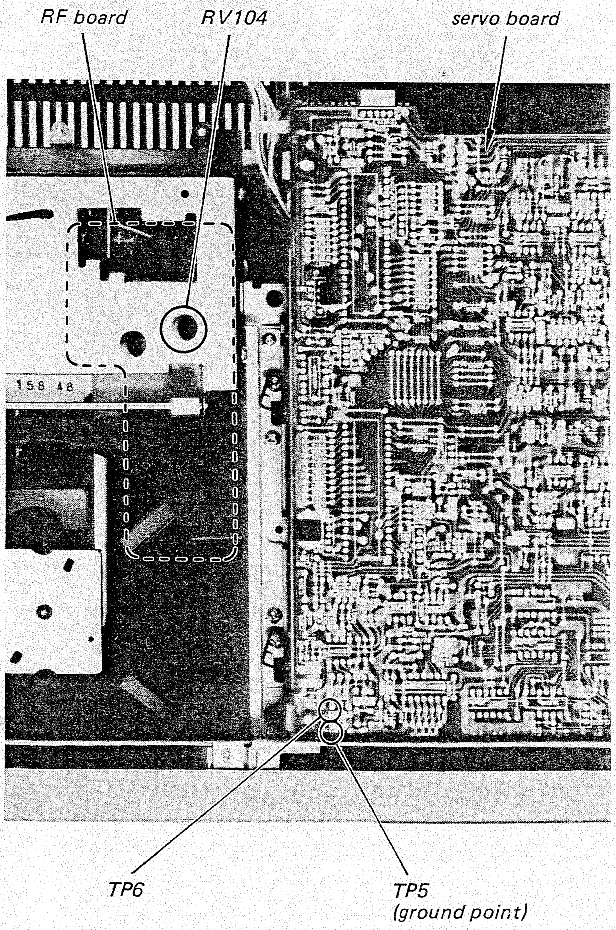
RF Offset Adjustment

Procedure:


oscilloscope
(DC range)
servo board
TP6
+
TP5
−
(ground point)

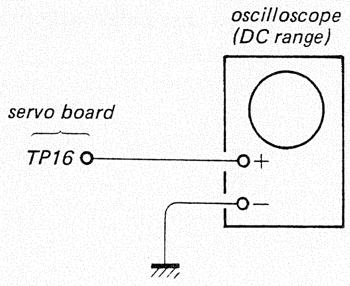
1. Turn on the power switch. (STOP mode)
2. Connect the oscilloscope to servo board test points TP6 and TP5.
3. Adjust RV104 so that oscilloscope reading is DC −1.9 ± 0.05 V.

Adjustment Location: servo board, RF board


RF board
RV104
servo board
TP6
TP5
(ground point)

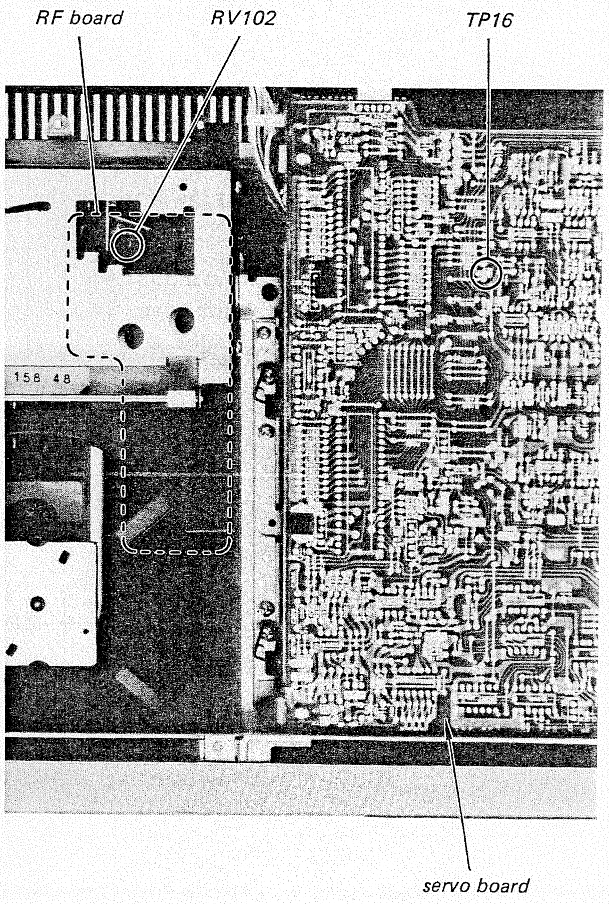
Tracking Offset Adjustment

Procedure:


oscilloscope
(DC range)
servo board
TP16
+
−

1. Turn on the power switch. (STOP mode)
2. Connect the oscilloscope to servo board test point TP16.
3. Adjust the RV102 so that oscilloscope reading is DC 0 ± 0.05 V.

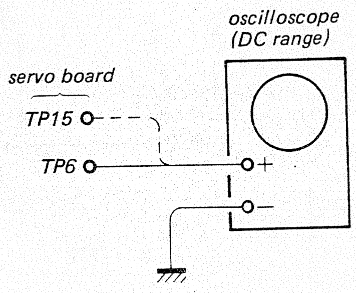
Adjustment Location: servo board, RF board


RF board
RV102
TP16
servo board

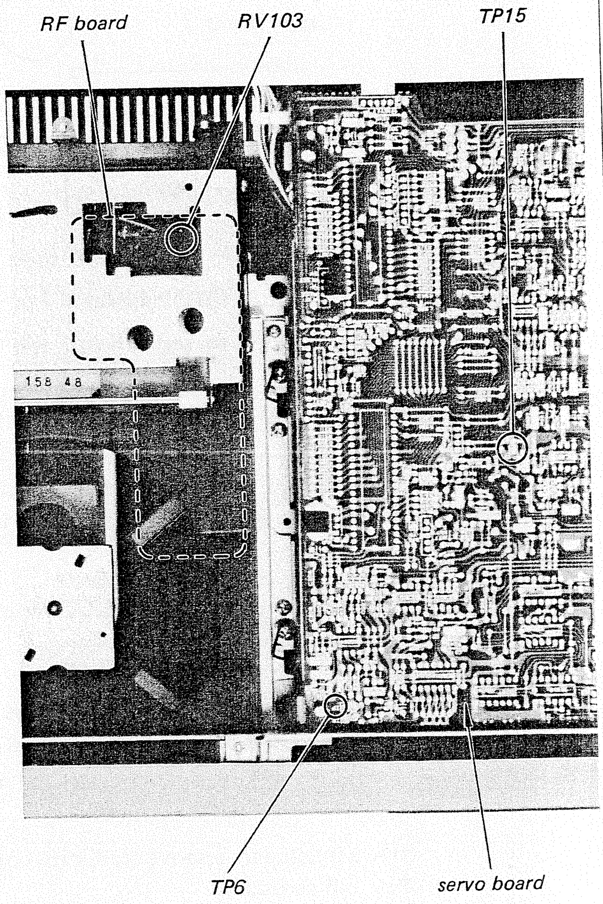
Focus Bias Adjustment

Procedure:

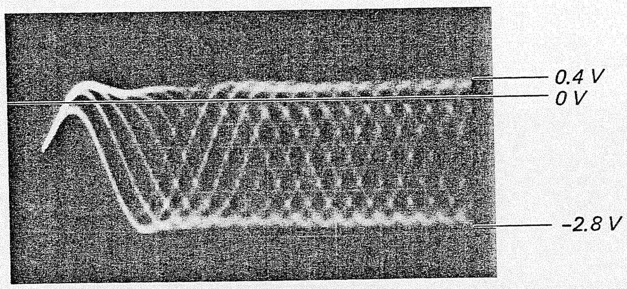
Adjustment Location: servo board, RF board


oscilloscope
(DC range)
servo board
TP15
TP6
+
−

1. Turn on the power switch. (STOP mode)
2. Connect the oscilloscope to servo board test point TP15.
3. Adjust RV103 so that oscilloscope reading is DC 0 V.
4. Connect the oscilloscope to servo board test point TP6.
5. Insert the disc (YEDS-1) and press the ▶ PLAY button.
6. Adjust RV103 for an optimum waveform eye pattern or so that the peak is maximum. Optimum eye pattern means that shap "◇" can be clearly distinguished at the center of the waveform.

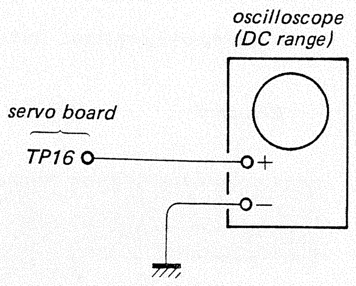

RF board
RV103
TP15
158 48
TP6
servo board

RF signal waveform (eye pattern)



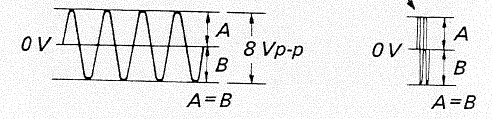
Tracking Balance Adjustment

Procedure:


oscilloscope
(DC range)
servo board
TP16
+
−

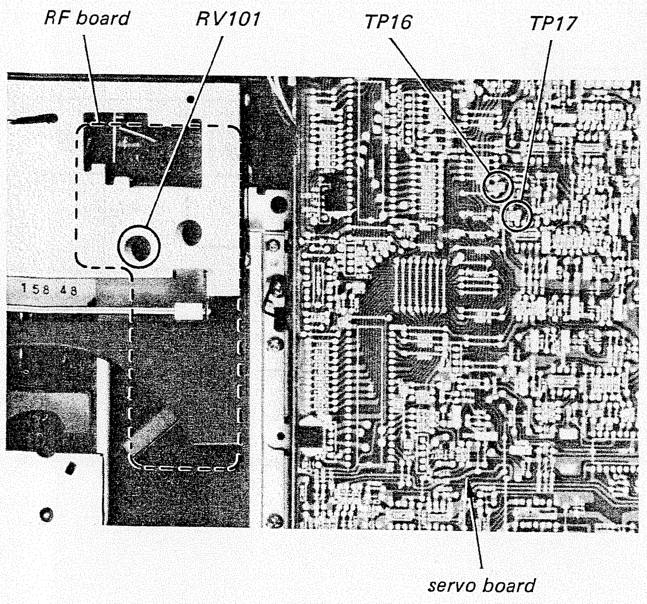
1. Put set in adjustment mode. (See page 42.)
2. Connect servo board test point TP17 to chassis.
3. Connect oscilloscope to servo board test point TP16.
4. Insert the disc (YEDS-1) and press ▶PLAY button.
5. Adjust RV101 so that oscilloscope waveform is symmetrical above and below, relative to 0 V.

Note: Set the sweep time longer for easy waveform checking.


0 V
A
B
8 Vp-p
A=B
0 V
A
B
A=B

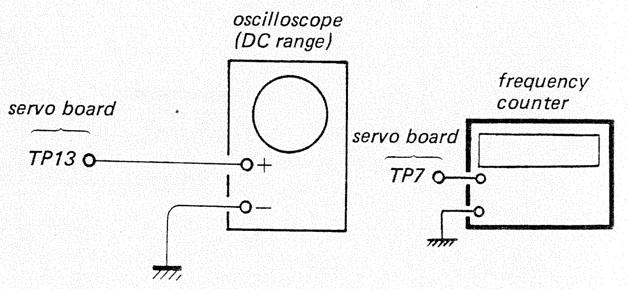
6. After adjustment, remove lead wire connecting TP17 and chassis.
7. Cancel the adjustment mode.

Adjustment Location: servo board, RF board

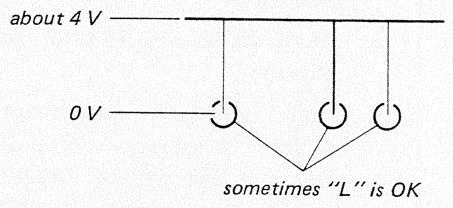

RF board
RV101
TP16
TP17
158 48
servo board

RF PLL Adjustment

Procedure:


oscilloscope
(DC range)
frequency counter
servo board
TP13
+
−
servo board
TP7

1. Put set in adjustment mode. (See page 42.)
2. Connect oscilloscope to servo board test point TP13.
3. Insert the disc (YEDS-1) and press ▶PLAY button.
4. Confirm that the oscilloscope waveform is "H" as shown in the figure below.


about 4 V
0 V
sometimes "L" is OK

- Confirm the following items A and B when the waveform is as shown above. If it is not, perform the adjustment in step 5 – 11.

A. Connect VOM to D210 cathode and read the voltage value.
   Reading: DC 0 ± 1 V

B. Connect frequency counter to servo board test point TP17 and read frequency.
   Reading: 4.3218 MHz ± 40 kHz

5. Connect frequency counter to servo board test point TP17.
6. Turn RV402 fully clockwise.
7. Adjust T201 so that frequency counter reading is 4.3218 MHz ± 40 kHz.

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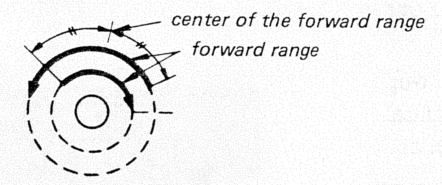
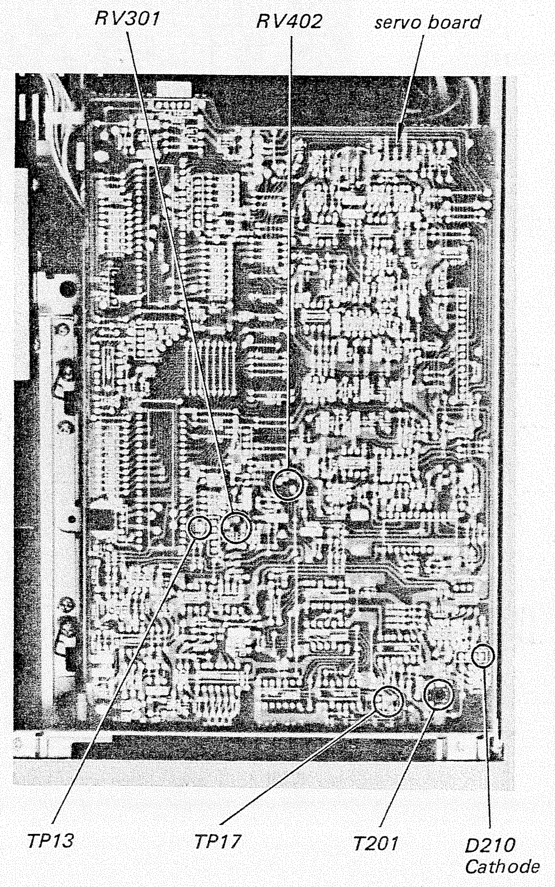
Rundfunk - Fernseh - Video
Albertstraße 12, 1000 Berlin 62
Tel. 781 20 44/45 Fax. 782 06 87

8. Adjust RV402 so that timer counter is forward. Secure RV402 at the center of the forward ranges of both turns as shown below.



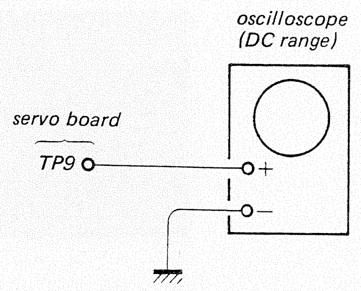
9. Turn RV301 fully counterclockwise and confirm to hear playback sound.
10. Connect oscilloscope to servo board test point TP13.
11. Confirm that the waveform is like the one shown in step 4.
    If it is not, perform adjustments in step 5 – 11.
12. Cancel the adjustment mode. (See page 42.)

Adjustment Location: servo board

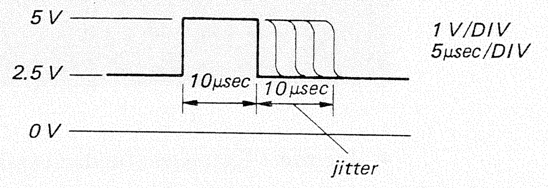


CLV PLL Adjustment

Procedure:

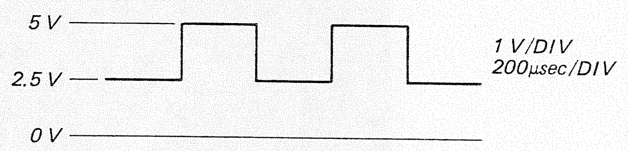


1. Put set in adjustment mode. (See page 42.)
   But RV103 is normlity position.
2. Connect oscilloscope to servo board test point TP9.
3. Insert the disc (YEDS-1) and press ▶ PLAY button.
4. Adjust RV401 so that the waveform is as shown in the figure below.

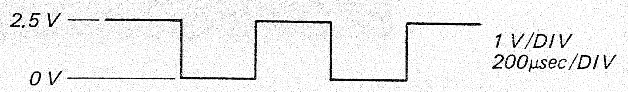


- **Incorrect Example**

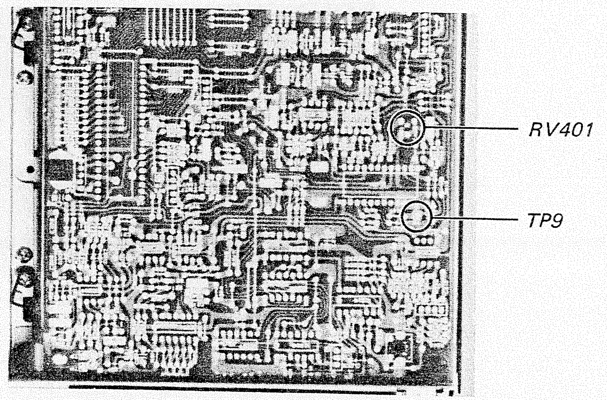
turned too far clockwise



turned too far counterclockwise



Adjustment Location: servo board



REFERENCE

Focus/Tracking Gain Adjustment

A frequency response analyzer is necessary in order to perform this adjustment exactly.
However, this gain has a margin, so even if it is slightly off, there is no problem. Therefore, do not perform this adjustment.

Focus/tracking gain determines the pick-up follow-up (vertical and horizontal) relative to mechanical noise and mechanical shock when the 2-axis device operates.
However, as these reciprocate, the adjustment is at the point where both are satisfied.

- When gain is raised, the nise is increasingly when 2-axis device operates.
- When gain is lowered, it is more susceptible to mechanical shock and skipping occurs more easily.
  When gain adjustment is off, the symptoms below appear.

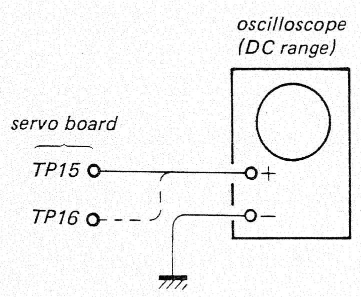
Symptoms \ Gain	Focus	Tracking
• The time until music starts becomes longer for STOP → ▷ PLAY (Normally takes about 4 seconds.).	low	low
• The time until music starts becomes longer for automatic selection (⏮, ⏭ buttons pressed). (Normally take about 2 seconds.)	—	low
• Music does not start and disc continues to rotate for STOP → ▷ PLAY or automatic selection (⏮, ⏭ buttons pressed.)	—	low
• Intermittent sound is heard during the play.	low	low
• The display on the time counter does not go ahead.	—	low
• The disc compartment opens and the holding of the disc by the rim releases.	low	—
• More noise during 2-axis device operation.	high	high

The following is a simple adjustment method.

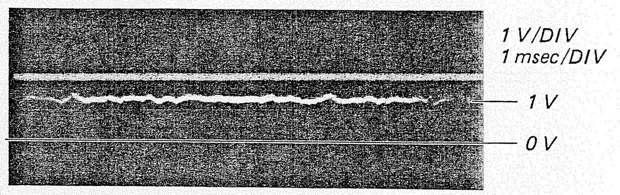
– Simple Adjustment –

Note: Since exact adjustment cannot be performed, remember the positions of the controls before performing the adjustment. If the positions after the simple adjustment are only a little different, return the controls to the original positions.

Procedure:

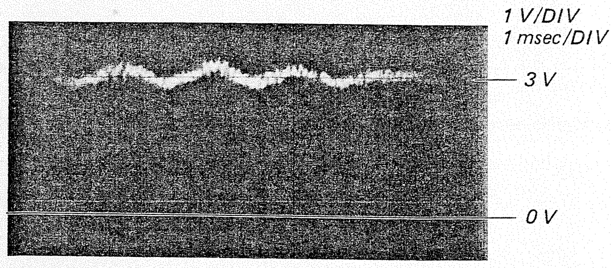


1. Keep the set horizontal.
   If the set is not horizontal, this adjustment cannot be performed due to the gravity against the 2 axis device.
2. Turn Power switch on, insert disc (YEDS-1) and press ▷ PLAY button.
3. Connect oscilloscope to servo board test point TP15.
4. Adjust RV403 so that waveform is as shown in the figure below. (focus gain adjustment)

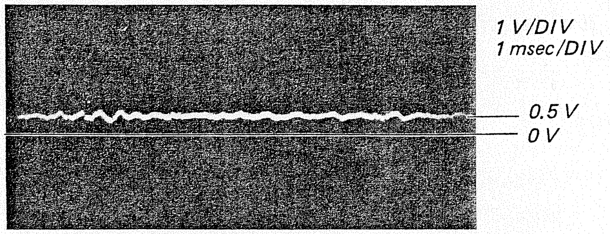


- Incorrect Examples (DC level changes more than on adjusted waveform)

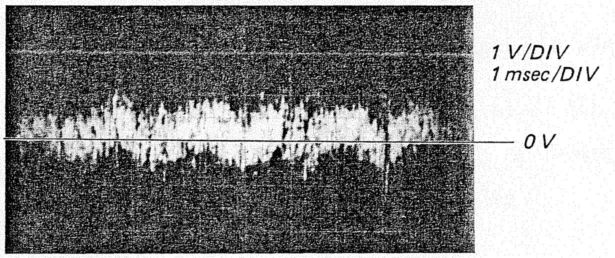
low focus gain



high focus gain

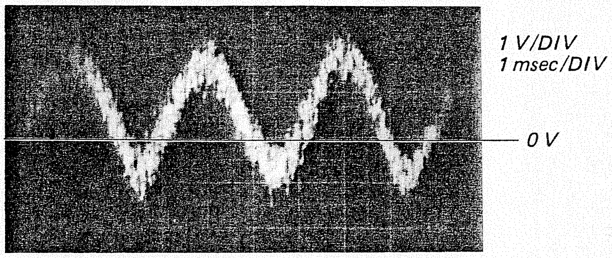


5. Connect oscilloscope to servo board test point TP16.
6. Adjust RV404 so that waveform is as shown in the figure below. (tracking gain adjustment)

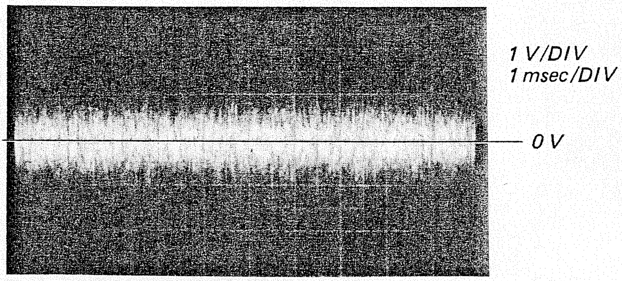


- Incorrect Examples (fundamental wave appears)

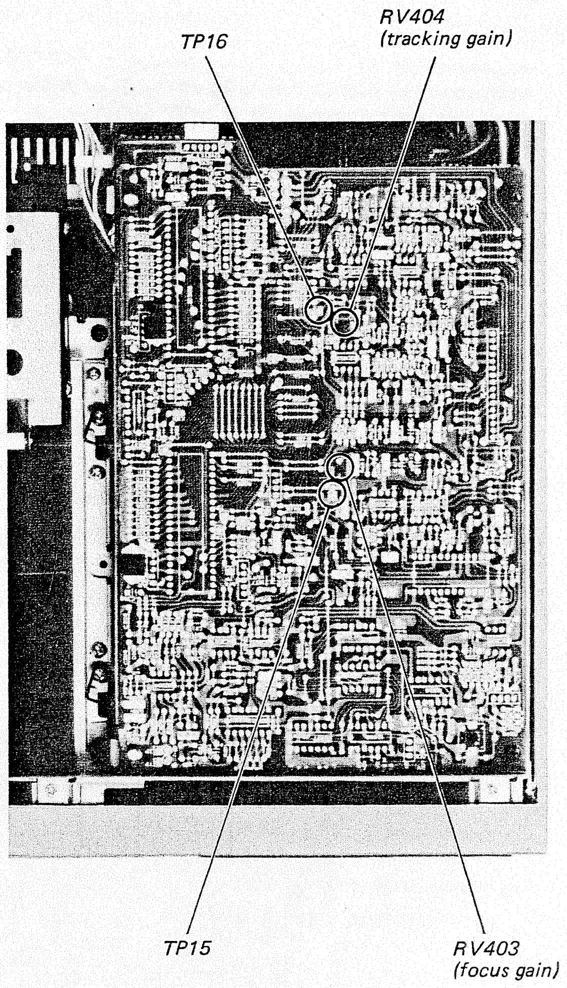
low tracking gain



high tracking gain



Adjustment Location: servo board


TP16
RV404
(tracking gain)
TP15
RV403
(focus gain)

SECTION 5
DIAGRAMS

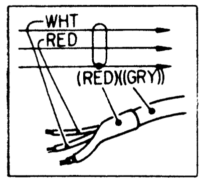
5-1. MOUNTING DIAGRAM

– System Control and Servo Section –

See page 57 for semiconductor lead layouts.

Note for MOUNTING DIAGRAM

- Color code of sleeving over the end of the jacket.


WHT
RED
(RED)(GRY)

- ○— : parts extracted from the component side.
- ■ : part mounted on the conductor side.
- : B + pattern
- ━▶━ : signal path
- ━▷ : L-CH signal path
- ━▷ : R-CH signal path

Note for SCHEMATIC DIAGRAM

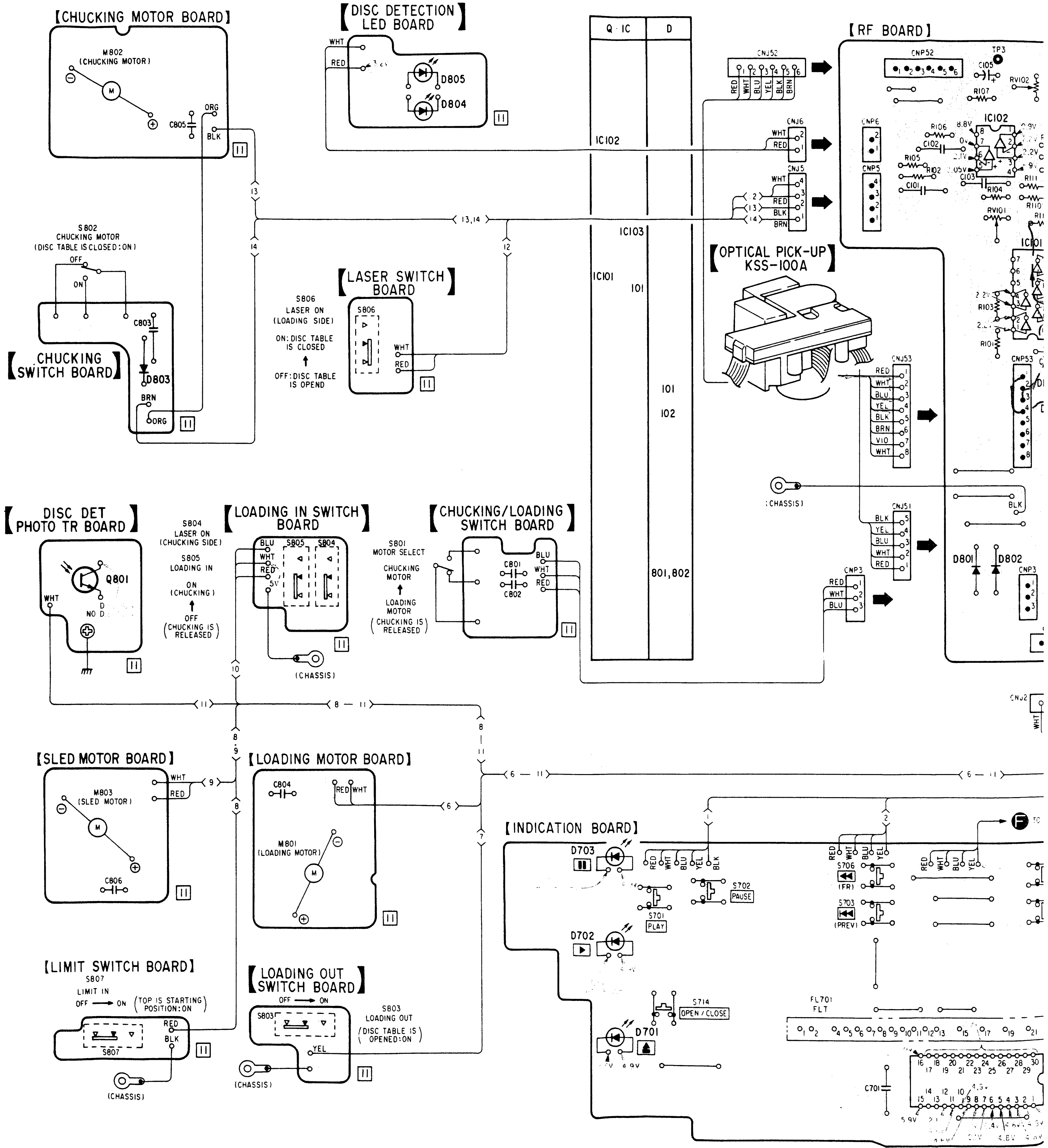
- All capacitors are in μF unless otherwise noted. pF: μμF 50WV or less are not indicated except for electrolytics and tantalums.
- All resistors are in ohms, 1/6 W unless otherwise noted. kΩ : 1000 Ω, MΩ : 1000 kΩ
- ☐ : panel designation.
- ☐ : adjustment for repair.
- ━ : B+ bus.
- ━ : B– bus.
- Voltages are dc with respect to ground unless otherwise noted.
- Readings are taken under no-signal conditions with a VOM (50 kΩ/V).
- Switches

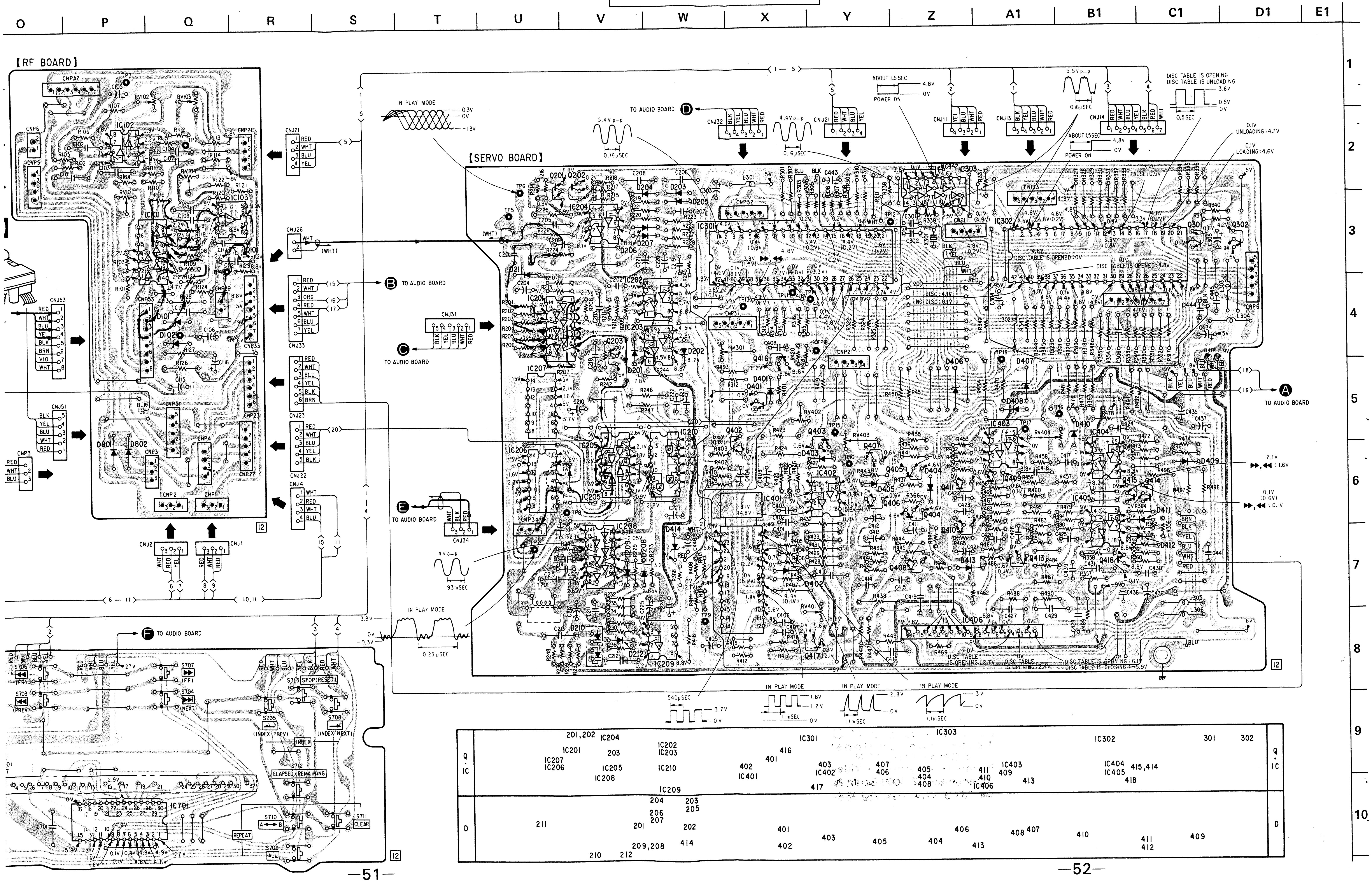
Ref. No.	Switch	Position
S701	▶ PLAY	OFF
S702	▌▌ PAUSE	OFF
S703	▌◀◀	OFF
S704	▶▶▌	OFF
S705	⇀ INDEX	OFF
S706	◀◀	OFF
S707	▶▶	OFF
S708	⇀ INDEX	OFF
S709	REPEAT ALL	OFF
S710	REPEAT A↔B	OFF
S711	REPEAT CLEAR	OFF
S712	ELAPSED/REMAINING	OFF
S713	STOP (RESET)	OFF
S714	▲ OPEN/CLOSE	OFF
S801	MOTOR SELECT	LOADING MOTOR
S802	CHUCKING MOTOR	OFF
S803	LOADING OUT	OFF
S804	LASER ON (CHUCKING SIDE)	OFF
S805	LOADING IN	OFF
S806	LASER ON (LOADING SIDE)	OFF
S807	LIMIT IN	OFF
S901	POWER	OFF

- : signal path

Note: Voltages are measured with a VOM (50kΩ/V).

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.


[CHUCKING MOTOR BOARD]
M802 (CHUCKING MOTOR)
C805
ORG
BLK
[DISC DETECTION LED BOARD]
WHT
RED
D805
D804
Q · IC
D
IC102
IC103
IC101
101
102
801,802
[RF BOARD]
CNJ52
CNP52
CNJ6
CNP6
CNJ5
CNP5
TP3
C105
RV102
R107
R106
IC102
C102
R105
C101
C103
R104
RV101
IC101
S802
CHUCKING MOTOR
(DISC TABLE IS CLOSED:ON)
OFF
ON
C803
D803
[CHUCKING SWITCH BOARD]
BRN
ORG
[LASER SWITCH BOARD]
S806
LASER ON (LOADING SIDE)
ON: DISC TABLE IS CLOSED
OFF: DISC TABLE IS OPEND
[OPTICAL PICK-UP] KSS-100A
CNJ53
CNP53
(CHASSIS)
CNJ51
CNP3
D801
D802
[DISC DET PHOTO TR BOARD]
Q801
S804
LASER ON (CHUCKING SIDE)
S805
LOADING IN
ON (CHUCKING)
OFF (CHUCKING IS RELEASED)
[LOADING IN SWITCH BOARD]
[CHUCKING/LOADING SWITCH BOARD]
S801
MOTOR SELECT
CHUCKING MOTOR
LOADING MOTOR (CHUCKING IS RELEASED)
C801
C802
[SLED MOTOR BOARD]
M803 (SLED MOTOR)
C806
[LOADING MOTOR BOARD]
C804
M801 (LOADING MOTOR)
[INDICATION BOARD]
D703
D702
D701
S701 PLAY
S702 PAUSE
S706 (FR)
S703 (PREV)
S714 OPEN/CLOSE
FL701 FLT
C701
[LIMIT SWITCH BOARD]
S807
LIMIT IN
OFF → ON (TOP IS STARTING POSITION:ON)
S807
[LOADING OUT SWITCH BOARD]
S803
LOADING OUT
(DISC TABLE IS OPENED:ON)
YEL
F

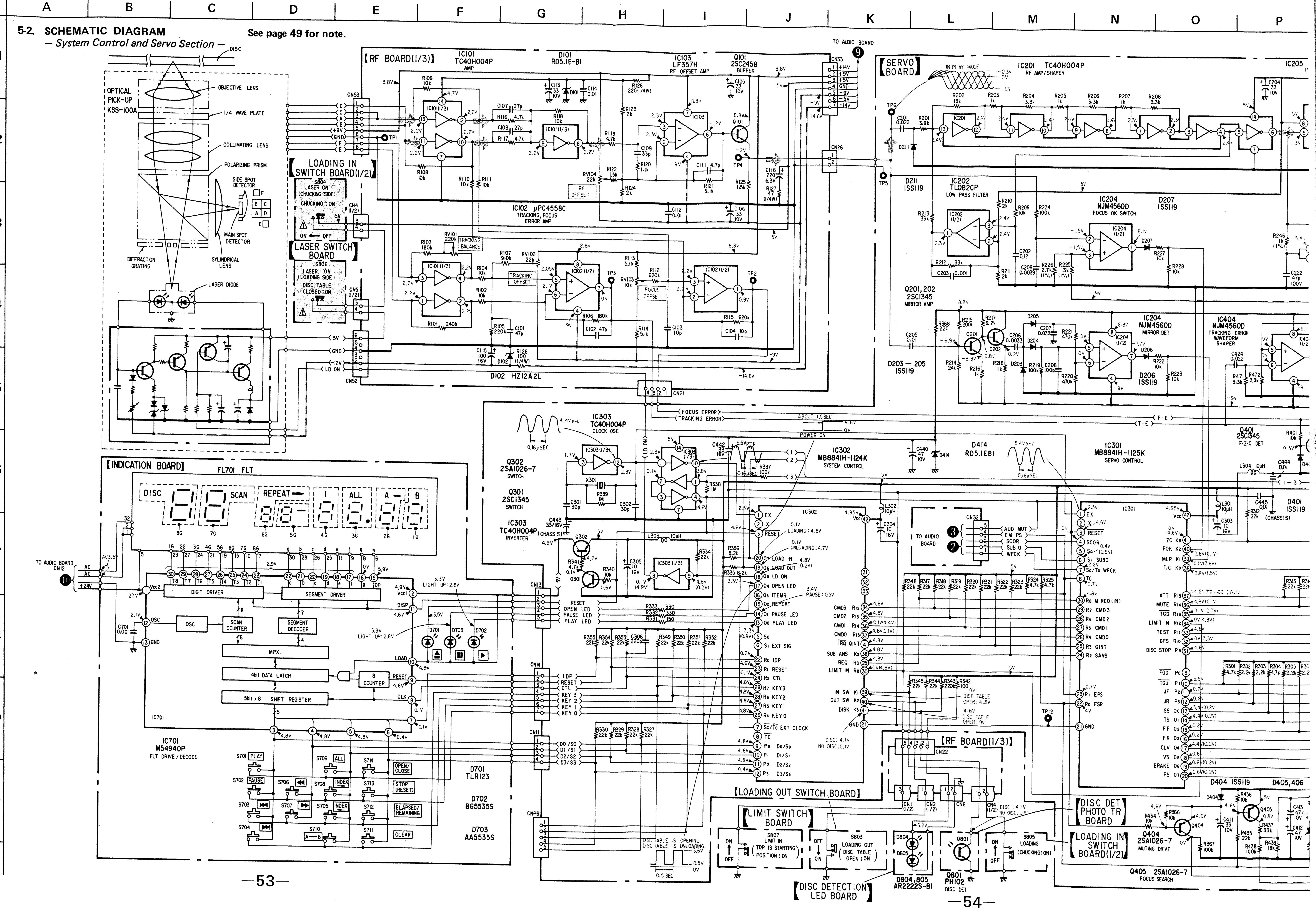

O
P
Q
R
S
T
U
V
W
X
Y
Z
A1
B1
C1
D1
E1
1
2
3
4
5
6
7
8
9
10
【RF BOARD】
【SERVO BOARD】
IN PLAY MODE
0.3V
0V
-1.3V
5.4V p-p
0.16μSEC
TO AUDIO BOARD
4.4V p-p
0.16μSEC
ABOUT 1.5SEC
4.8V
0V
POWER ON
5.5V p-p
0.16μSEC
ABOUT 1.5SEC
DISC TABLE IS OPENING
DISC TABLE IS UNLOADING
3.6V
0.5V
0V
0.5SEC
0.1V
UNLOADING: 4.7V
0.1V
LOADING: 4.6V
PAUSE: 0.5V
DISC TABLE IS OPENED: 0V
DISC TABLE IS OPENED: 4.8V
DISC: 4.1V
NO DISC: 0.1V
CNJ21
CNJ26
CNJ31
CNJ32
CNJ33
CNJ23
CNJ22
CNJ4
CNJ34
CNJ11
CNJ13
CNJ14
CNJ51
CNJ53
CNJ1
CNJ2
CNP3
IC101
IC102
IC103
IC201
IC202
IC203
IC204
IC205
IC206
IC207
IC208
IC209
IC210
IC301
IC302
IC303
IC401
IC402
IC403
IC404
IC405
IC406
IC701
4V p-p
93mSEC
3.8V
0V
-0.3V
0.23μSEC
540μSEC
3.7V
0V
IN PLAY MODE
1.8V
1.2V
1.1mSEC
0V
IN PLAY MODE
2.8V
0V
1.1mSEC
IN PLAY MODE
3V
0V
1.1mSEC
2.1V
▶▶, ◀◀ : 1.6V
0.1V
(0.6V)
▶▶, ◀◀ : 0.1V
DISC TABLE IS OPENING: 2.7V
DISC TABLE IS OPENING: 2.4V
DISC TABLE IS OPENING: 6.1V
DISC TABLE IS CLOSING: -5.9V
S706 (FF)
S703 (PREV)
S707 (FF)
S704 (NEXT)
S713 STOP(RESET)
S705 (INDEX PREV)
S708 (INDEX NEXT)
INDEX
S712 ELAPSED/REMAINING
REPEAT
S710 A↔B
S711 CLEAR
S709 ALL
12

	U	V	W	X	Y	Z	A1	B1	C1	D1
Q·IC	IC207 IC206	201,202 IC204 IC201 203 IC205 IC208	IC202 IC203 IC210 IC209	416 401 402 IC401	IC301 403 IC402 417 407 406	IC303 405 404 408	411 410 IC406 IC403 409 413	IC302 IC404 IC405 415,414 418		301 302
D	211	210 212	204 206 207 201 209,208 203 205 202 414	401 402	403 405	406 404	413 408 407	410	411 412 409	

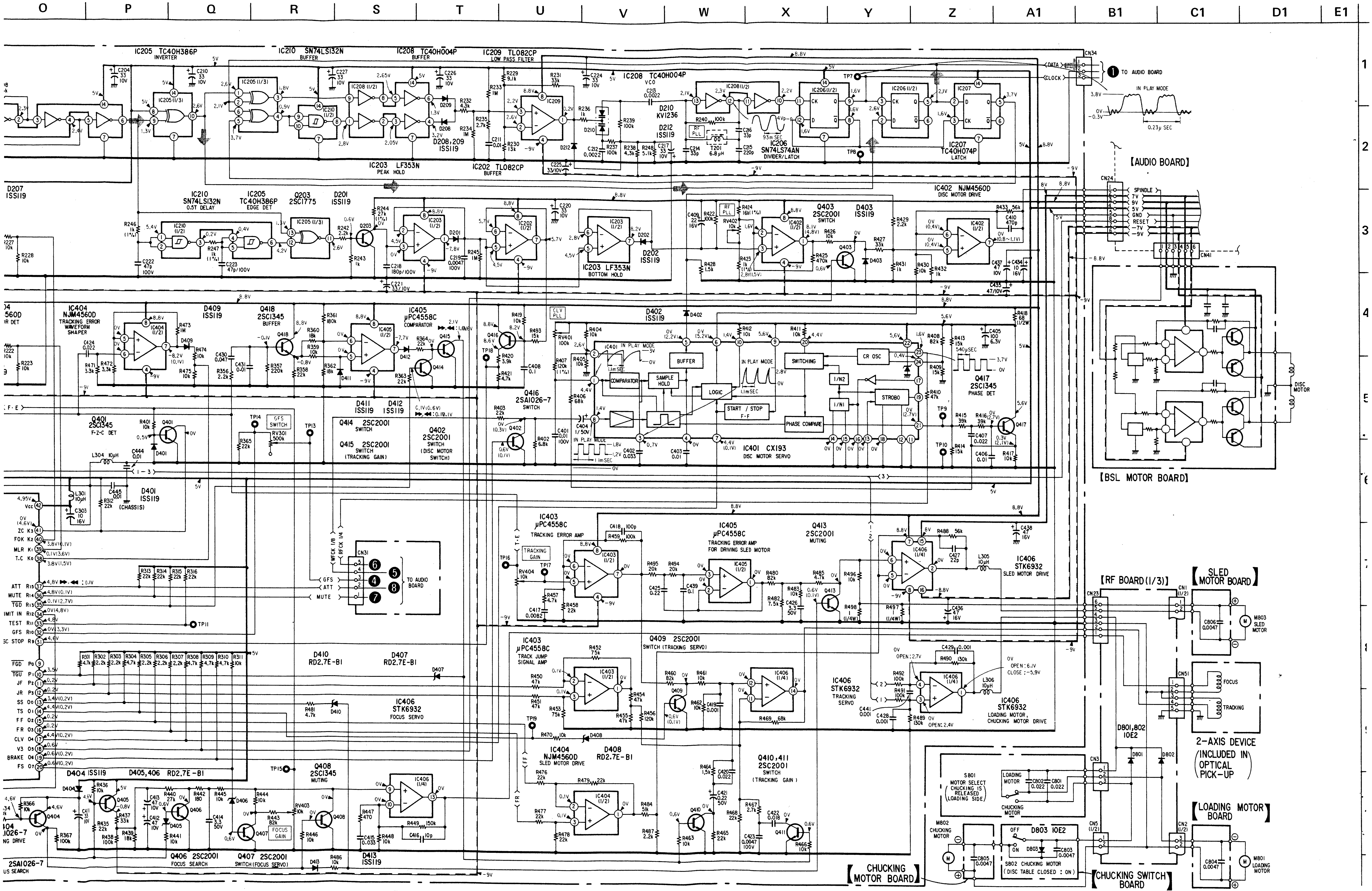
5-2. SCHEMATIC DIAGRAM

– System Control and Servo Section –

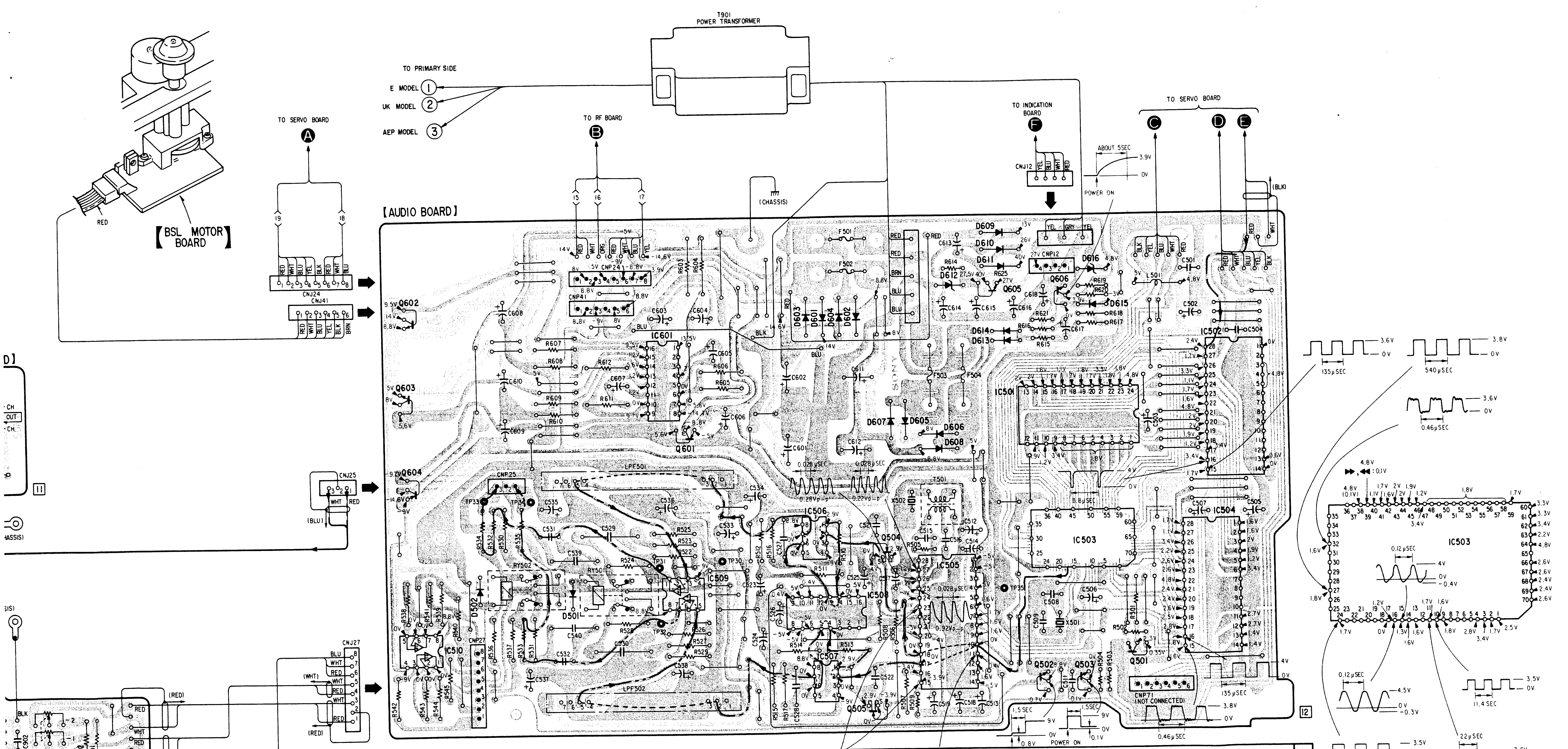
See page 49 for note.



A B C D E F G H I J K L M N O P
1 2 3 4 5 6 7 8 9 10
DISC
OPTICAL PICK-UP KSS-100A
OBJECTIVE LENS
1/4 WAVE PLATE
COLLIMATING LENS
POLARIZING PRISM
SIDE SPOT DETECTOR
MAIN SPOT DETECTOR
DIFFRACTION GRATING
SYLINDRICAL LENS
LASER DIODE
【RF BOARD(1/3)】
IC101 TC40H004P AMP
D101 RD5.1E-B1
IC103 LF357H RF OFFSET AMP
Q101 2SC2458 BUFFER
TO AUDIO BOARD 9
CN53
CN33
IC102 μPC4558C TRACKING, FOCUS ERROR AMP
【LOADING IN SWITCH BOARD(1/2)】
S804 LASER ON (CHUCKING SIDE) CHUCKING : ON
【LASER SWITCH BOARD】
S806 LASER ON (LOADING SIDE) DISC TABLE CLOSED : ON
TRACKING BALANCE
TRACKING OFFSET
FOCUS OFFSET
RF OFFSET
D102 HZ12A2L
CN52
CN21
FOCUS ERROR
TRACKING ERROR
【SERVO BOARD】
IN PLAY MODE
IC201 TC40H004P RF AMP/SHAPER
IC205
D211 1SS119
IC202 TL082CP LOW PASS FILTER
IC204 NJM4560D FOCUS OK SWITCH
D207 1SS119
Q201,202 2SC1345 MIRROR AMP
IC204 NJM4560D MIRROR DET
IC404 NJM4560D TRACKING ERROR WAVEFORM SHAPER
D203 – 205 1SS119
D206 1SS119
Q401 2SC1345 F-Z-C DET
D414 RD5.1EB1
IC301 MB8841H-1125K SERVO CONTROL
D401 1SS119
ABOUT 1.5SEC
POWER ON
IC303 TC40H004P CLOCK OSC
Q302 2SA1026-7 SWITCH
Q301 2SC1345 SWITCH
IC303 TC40H004P INVERTER
IC302 MB8841H-1124K SYSTEM CONTROL
CN32
TO AUDIO BOARD 3 2
AUD MUT
EM PS
SCOR
SUB Q
WFCK
【INDICATION BOARD】
FL701 FLT
DISC SCAN REPEAT I ALL A– B
TO AUDIO BOARD CN12 11
DIGIT DRIVER
SEGMENT DRIVER
OSC
SCAN COUNTER
SEGMENT DECODER
MPX.
4bit DATA LATCH
8 COUNTER
5bit x 8 SHIFT REGISTER
IC701 M54940P FLT DRIVE/DECODE
LIGHT UP: 2.8V
S701 PLAY
S702 PAUSE
S703
S704
S706
S707
S708 INDEX
S705 INDEX
S709 ALL
S710 A–B
S711 S712 S713 S714
OPEN/CLOSE
STOP (RESET)
ELAPSED/REMAINING
CLEAR
D701 TLR123
D702 BG5535S
D703 AA5535S
CN13 CN14 CN11 CNP6
RESET OPEN LED PAUSE LED PLAY LED
IDP RESET CTL KEY 3 KEY 2 KEY 1 KEY 0
D0/S0 D1/S1 D2/S2 D3/S3
DISC TABLE IS OPENING
DISC TABLE IS UNLOADING
0.5 SEC
【LOADING OUT SWITCH BOARD】
【LIMIT SWITCH BOARD】
S807 LIMIT IN TOP IS STARTING (POSITION : ON)
S803 LOADING OUT (DISC TABLE OPEN : ON)
【RF BOARD(1/3)】 CN22
【DISC DETECTION LED BOARD】
D804,805 AR2222S-B1
Q801 PH102 DISC DET
S805 LOADING (CHUCKING : ON)
【DISC DET PHOTO TR BOARD】
【LOADING IN SWITCH BOARD(1/2)】
Q404 2SA1026-7 MUTING DRIVE
Q405 2SA1026-7 FOCUS SEARCH
D404 1SS119
D405,406


O P Q R S T U V W X Y Z A1 B1 C1 D1 E1
IC205 TC40H386P INVERTER
IC210 SN74LS132N BUFFER
IC208 TC40H004P BUFFER
IC209 TL082CP LOW PASS FILTER
IC208 TC40H004P VCO
D210 KV1236
D212 1SS119
IC206 SN74LS74AN DIVIDER/LATCH
IC207 TC40H074P LATCH
TO AUDIO BOARD
DATA
CLOCK
CN34
IN PLAY MODE
0.23μ SEC
IC203 LF353N PEAK HOLD
IC202 TL082CP BUFFER
D208,209 1SS119
IC210 SN74LS132N 0.5T DELAY
IC205 TC40H386P EDGE DET
Q203 2SC1775
D201 1SS119
D207 1SS119
IC203 LF353N BOTTOM HOLD
D202 1SS119
IC402 NJM4560D DISC MOTOR DRIVE
Q403 2SC2001 SWITCH
D403 1SS119
[AUDIO BOARD]
CN24
SPINDLE
7V
9V
5V
GND
RESET
-7V
-9V
CN41
[BSL MOTOR BOARD]
DISC MOTOR
IC404 NJM4560D TRACKING ERROR WAVEFORM SHAPER
D409 1SS119
Q418 2SC1345 BUFFER
IC405 μPC4558C COMPARATOR
Q416 2SA1026-7 SWITCH
D402 1SS119
CLV PLL
COMPARATOR
SAMPLE HOLD
BUFFER
LOGIC
START / STOP F-F
SWITCHING
CR OSC
1/N2
1/N1
STROBO
PHASE COMPARE
IC401 CX193 DISC MOTOR SERVO
Q417 2SC1345 PHASE DET
Q401 2SC1345 F-Z-C DET
D401 1SS119
D411 1SS119
D412 1SS119
Q414 2SC2001 SWITCH
Q415 2SC2001 SWITCH (TRACKING GAIN)
Q402 2SC2001 SWITCH (DISC MOTOR SWITCH)
GFS SWITCH
TP14 TP13
CN31
TO AUDIO BOARD
GFS
ATT
MUTE
IC403 μPC4558C TRACKING ERROR AMP
TRACKING GAIN
IC405 μPC4558C TRACKING ERROR AMP FOR DRIVING SLED MOTOR
Q413 2SC2001 MUTING
IC406 STK6932 SLED MOTOR DRIVE
[RF BOARD (1/3)]
CN23
[SLED MOTOR BOARD]
M803 SLED MOTOR
D410 RD2.7E-B1
D407 RD2.7E-B1
IC406 STK6932 FOCUS SERVO
IC403 μPC4558C TRACK JUMP SIGNAL AMP
Q409 2SC2001 SWITCH (TRACKING SERVO)
IC406 STK6932 TRACKING SERVO
IC406 STK6932 LOADING MOTOR, CHUCKING MOTOR DRIVE
CN51
FOCUS
TRACKING
2-AXIS DEVICE (INCLUDED IN OPTICAL PICK-UP)
D801,802 10E2
IC404 NJM4560D SLED MOTOR DRIVE
D408 RD2.7E-B1
Q410,411 2SC2001 SWITCH (TRACKING GAIN)
Q408 2SC1345 MUTING
D404 1SS119
D405,406 RD2.7E-B1
Q406 2SC2001 FOCUS SEARCH
Q407 2SC2001 SWITCH (FOCUS SERVO)
FOCUS GAIN
D413 1SS119
Q404 2SA1026-7 FOCUS SEARCH
S801 MOTOR SELECT CHUCKING IS RELEASED LOADING SIDE
LOADING MOTOR
CHUCKING MOTOR
M802 CHUCKING MOTOR
D803 10E2
S802 CHUCKING MOTOR (DISC TABLE CLOSED : ON)
[CHUCKING MOTOR BOARD]
[CHUCKING SWITCH BOARD]
[LOADING MOTOR BOARD]
M801 LOADING MOTOR
CN3 CN5 CN2 CN1
Vcc ZC FOK MLR T.C ATT MUTE TGD IMIT IN TEST GFS STOP FGD TGU JF JR SS TS FF FR CLV V3 BRAKE FS

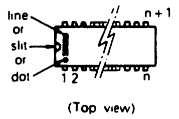
I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y


T901
POWER TRANSFORMER
TO PRIMARY SIDE
E MODEL ①
UK MODEL ②
AEP MODEL ③
TO SERVO BOARD
A
TO RF BOARD
B
TO INDICATION BOARD
F
TO SERVO BOARD
C
D
E
BSL MOTOR BOARD
RED
CNJ24
CNJ41
CNJ25
CNJ27
CNJ12
(CHASSIS)
(BLK)
ABOUT 5SEC
3.9V
0V
POWER ON
AUDIO BOARD
IC601
IC501
IC502
IC503
IC504
IC505
IC506
IC507
IC508
IC509
IC510
Q601
Q602
Q603
Q604
Q605
Q606
Q501
Q502
Q503
Q504
Q505
LPF501
LPF502
RY501
RY502
T501
X501
X502
CNP71 (NOT CONNECTED)
VR901-1,2 LEVEL (HEADPHONES)
135μSEC
540μSEC
0.46μSEC
0.12μSEC
1.06mSEC
22μSEC
11.4SEC
22.5μSEC
1.5SEC
0.028μSEC
II
12

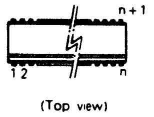
	M	N	O	P	Q	R	S	T	U	V
Q IC	602 603 604 IC510			IC601 601 IC509	IC506 IC508 IC507	504 505 IC505	605 502	606 IC501 IC503 503 501	IC502 IC504	
D		502	501		603,601,602,604	607,605 606 608	612 609 610 611 614 613	616 615		

- **Semiconductor Lead Layouts**

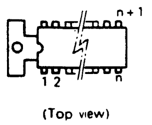
CX10035
CX20017
HD14053BP
M54940P
MSM5128-12RS
NE5532P
NJM4560D
NJM4560D-D
SN74LS74AN
SN74LS132N
TC40H004P
TC40H074P
TC40H386P
TL082CP
μPC4558C


line
or
slit
or
dot
n+1
1 2
n
(Top view)

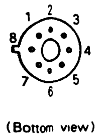
CX7933
CX7935
MB8841H-1214K
MB8841H-1215K


n+1
1 2
n
(Top view)

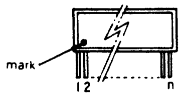
CX193


n+1
1 2
n
(Top view)

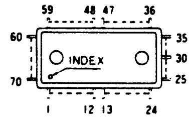
LF353H
LF357H


1
2
3
8
4
7
5
6
(Bottom view)

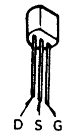
STK6932



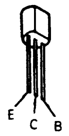
CX7934


59
48 47
36
60
35
30
25
INDEX
70
1
12 13
24

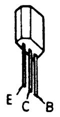
2SK152-3



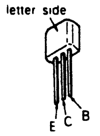
2SC1345
2SC1775A
2SC2001



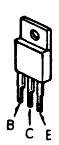
2SA1027R



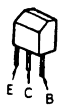
2SC2458


letter side
E C B

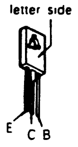
2SD880



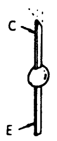
2SD774



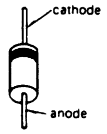
2SB731
2SD809


letter side
E C B

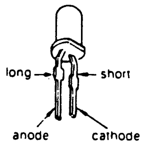
PH102



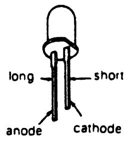
10DF2
10E2
1SS119
HZ12A-2L
HZ27-3L
RD2.7E-B1
RD5.1E-B1
31DQ5


cathode
anode

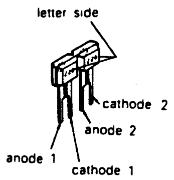
TLR123


long
short
anode
cathode

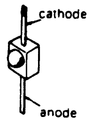
AA5535S
BG5535S


long
short
anode
cathode

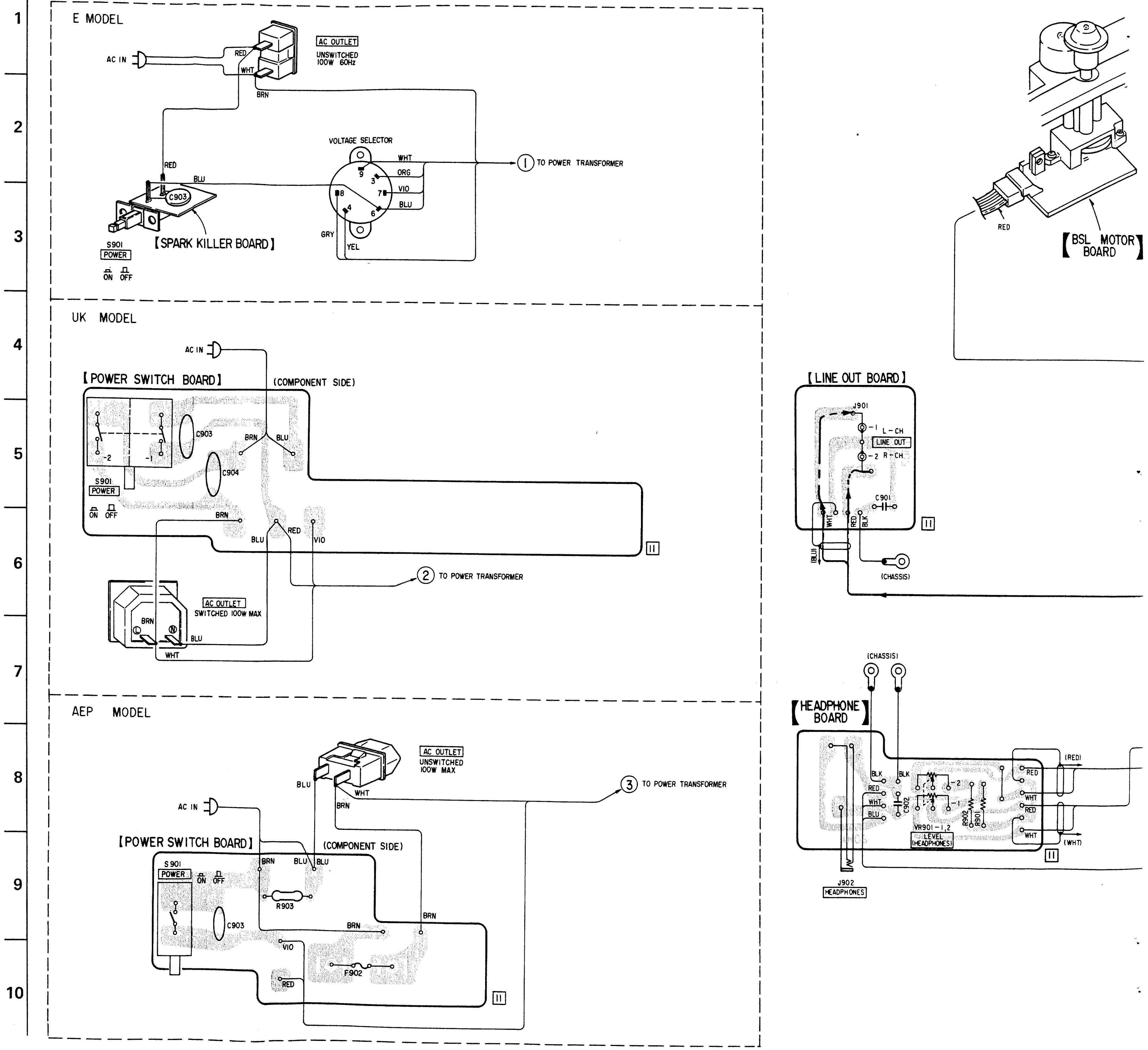
KV1236


letter side
cathode 2
anode 2
anode 1
cathode 1

AR2222S

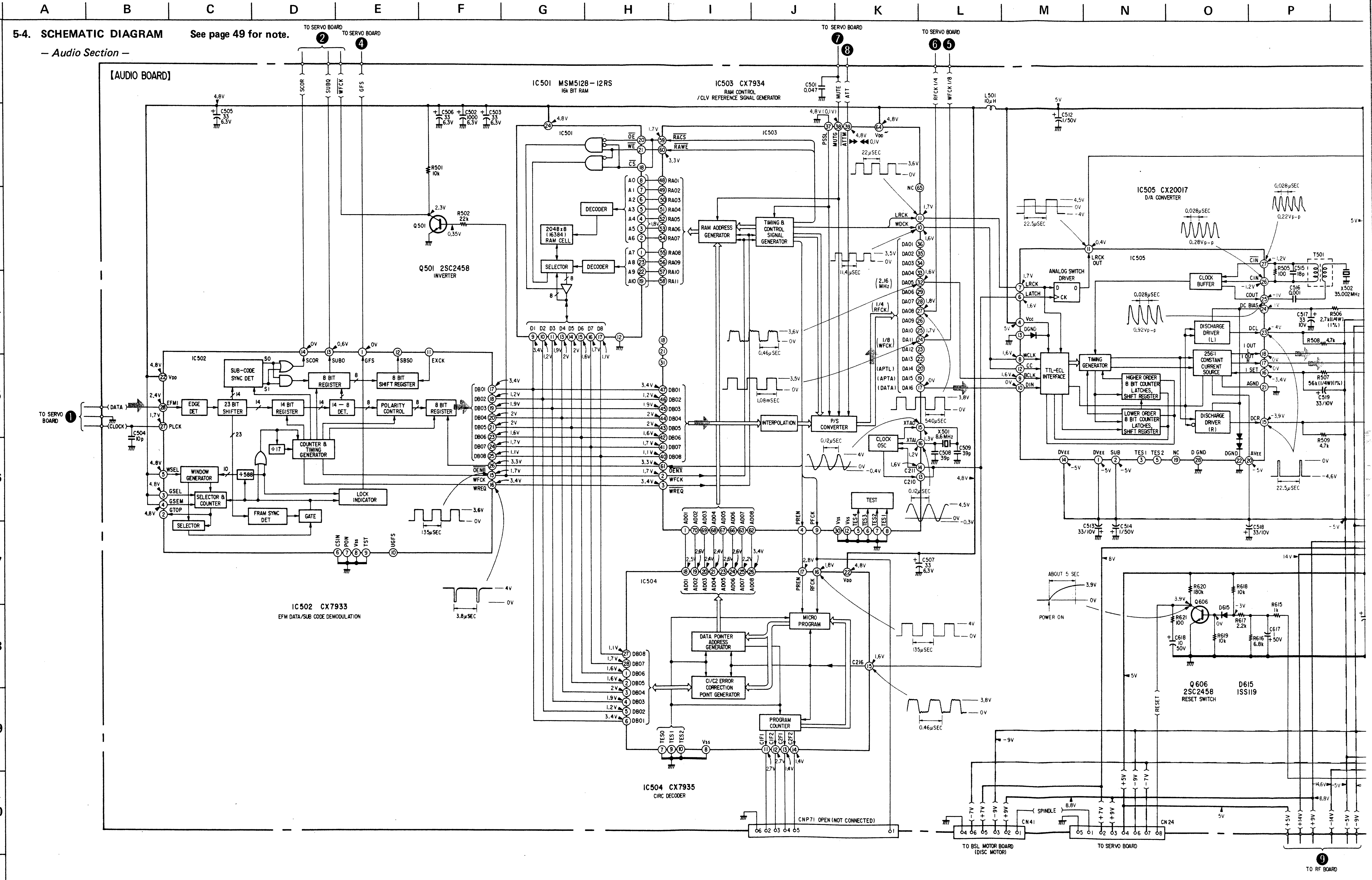

cathode
anode

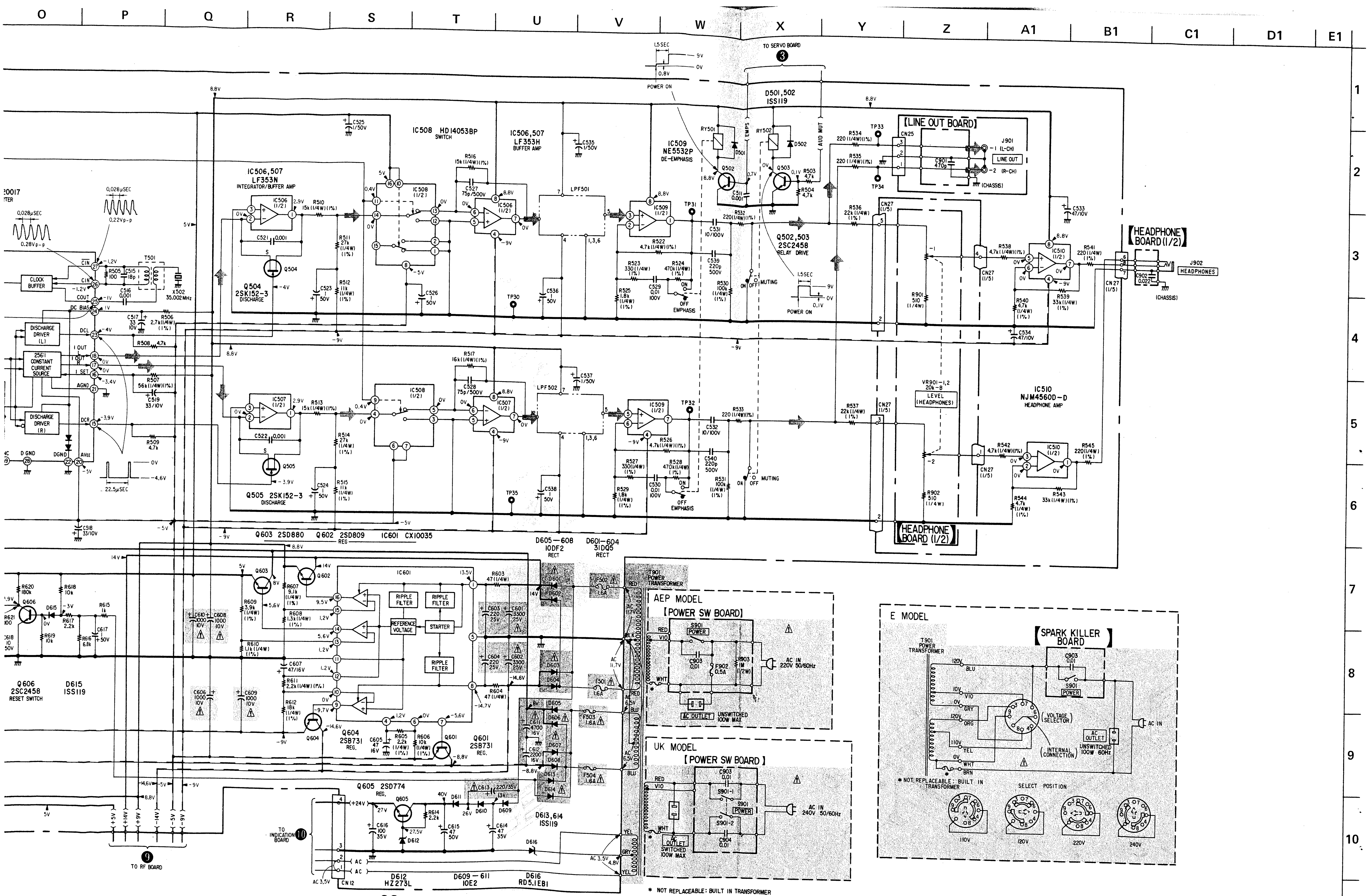
5-3. MOUNTING DIAGRAM *– Audio Section –* See page 49 for note.


A
B
C
D
E
F
G
H
I
J
1
2
3
4
5
6
7
8
9
10
E MODEL
AC IN
RED
WHT
BRN
AC OUTLET
UNSWITCHED
100W 60Hz
VOLTAGE SELECTOR
WHT
ORG
VIO
BLU
GRY
YEL
9
3
7
8
4
6
① TO POWER TRANSFORMER
RED
BLU
C903
S901
POWER
ON OFF
【SPARK KILLER BOARD】
UK MODEL
AC IN
【POWER SWITCH BOARD】
(COMPONENT SIDE)
C903
C904
BRN
BLU
S901
POWER
ON OFF
-2
-1
BRN
BLU
RED
VIO
II
② TO POWER TRANSFORMER
AC OUTLET
SWITCHED 100W MAX
BRN
BLU
WHT
AEP MODEL
AC OUTLET
UNSWITCHED
100W MAX
BLU
WHT
BRN
③ TO POWER TRANSFORMER
AC IN
【POWER SWITCH BOARD】
(COMPONENT SIDE)
S901
POWER
ON OFF
BRN
BLU
BLU
R903
C903
BRN
BRN
VIO
F902
RED
II
RED
【BSL MOTOR BOARD】
【LINE OUT BOARD】
J901
-1 L-CH
LINE OUT
-2 R-CH
C901
WHT
RED
BLK
II
(BLU)
(CHASSIS)
(CHASSIS)
【HEADPHONE BOARD】
BLK
BLK
RED
WHT
BLU
C902
-2
-1
VR901-1,2
LEVEL
(HEADPHONES)
R902
R901
RED
WHT
RED
WHT
(RED)
(WHT)
II
J902
HEADPHONES

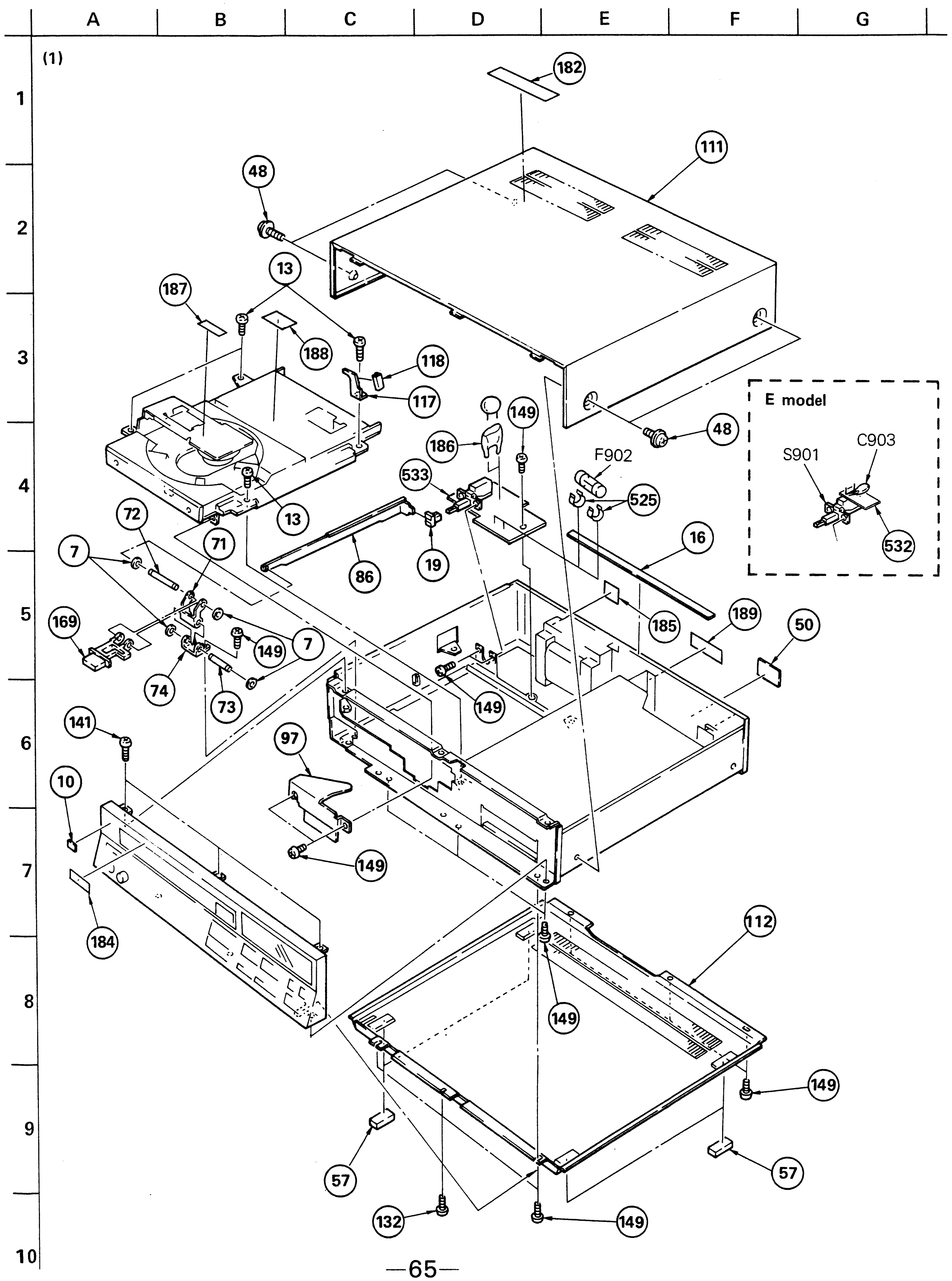
5-4. SCHEMATIC DIAGRAM See page 49 for note.

– Audio Section –


A B C D E F G H I J K L M N O P
1 2 3 4 5 6 7 8 9 10
【AUDIO BOARD】
TO SERVO BOARD ❷
TO SERVO BOARD ❹
TO SERVO BOARD ❼ ❽
TO SERVO BOARD ❻ ❺
TO SERVO BOARD ❶
TO RF BOARD ❾
SCOR SUBQ WFCK GFS
MUTE ATT
RFCK 1/4 WFCK 1/8
IC501 MSM5128-12RS
16k BIT RAM
IC503 CX7934
RAM CONTROL /CLV REFERENCE SIGNAL GENERATOR
IC505 CX20017
D/A CONVERTER
IC502 CX7933
EFM DATA/SUB CODE DEMODULATION
IC504 CX7935
CIRC DECODER
Q501 2SC2458
INVERTER
Q606 2SC2458
RESET SWITCH
D615 1SS119
2048×8 (16384) RAM CELL
DECODER
SELECTOR
RAM ADDRESS GENERATOR
TIMING & CONTROL SIGNAL GENERATOR
INTERPOLATION
P/S CONVERTER
CLOCK OSC
TEST
SUB-CODE SYNC DET
8 BIT REGISTER
8 BIT SHIFT REGISTER
EDGE DET
23 BIT SHIFTER
14 BIT REGISTER
14 – 8 DET.
POLARITY CONTROL
8 BIT REGISTER
COUNTER & TIMING GENERATOR
WINDOW GENERATOR
÷588
÷17
SELECTOR & COUNTER
FRAM SYNC DET
GATE
SELECTOR
LOCK INDICATOR
MICRO PROGRAM
DATA POINTER ADDRESS GENERATOR
C1/C2 ERROR CORRECTION POINT GENERATOR
PROGRAM COUNTER
ANALOG SWITCH DRIVER
TTL-ECL INTERFACE
TIMING GENERATOR
HIGHER ORDER 8 BIT COUNTER LATCHES, SHIFT REGISTER
LOWER ORDER 8 BIT COUNTER LATCHES, SHIFT REGISTER
CLOCK BUFFER
DISCHARGE DRIVER (L)
DISCHARGE DRIVER (R)
256:1 CONSTANT CURRENT SOURCE
X501 8.6 MHz
X502 35.002MHz
T501
L501 10μH
C501 0.047
C505 33 6.3V
C506 33 6.3V
C502 1000 6.3V
C503 33 6.3V
C512 1/50V
R501 10k
R502 22k
C504 10p
C507 33 6.3V
C508 39p
C509 39p
C513 33/10V
C514 1/50V
C518 33/10V
R505 100
C515 18p
C516 0.001
C517 33 10V
R506 2.7k(1/4W)(1%)
R508 4.7k
R507 56k(1/4W)(1%)
C519 33/10V
R509 4.7k
R620 180k
R618 10k
R621 100
C618 10 50V
R619 10k
R617 2.2k
R615 1k
R616 6.8k
C617 1 50V
22μSEC
11.4μSEC
0.46μSEC
1.08mSEC
540μSEC
0.12μSEC
135μSEC
3.8μSEC
22.5μSEC
0.028μSEC
0.28Vp-p
0.22Vp-p
0.92Vp-p
(2.16 MHz)
(1/4 RFCK)
(1/8 WFCK)
(APTL)
(APTA)
(DATA)
ABOUT 5 SEC
POWER ON
SPINDLE
CNP71 OPEN (NOT CONNECTED)
CN41
CN24
TO BSL MOTOR BOARD (DISC MOTOR)
TO SERVO BOARD
RESET


O
P
Q
R
S
T
U
V
W
X
Y
Z
A1
B1
C1
D1
E1
1
2
3
4
5
6
7
8
9
10
1.5SEC
9V
0V
0.8V
POWER ON
TO SERVO BOARD
3
D501,502
ISS119
8.8V
IC508 HD14053BP
SWITCH
IC506,507
LF353H
BUFFER AMP
IC506,507
LF353N
INTEGRATOR/BUFFER AMP
IC509
NE5532P
DE-EMPHASIS
EMPS
AUD MUT
RY501
RY502
Q502
Q503
TP33
TP34
CN25
【LINE OUT BOARD】
J901
LINE OUT
(L-CH)
(R-CH)
(CHASSIS)
LPF501
LPF502
TP30
TP31
TP32
TP35
Q504
2SK152-3
DISCHARGE
Q505 2SK152-3
DISCHARGE
Q502,503
2SC2458
RELAY DRIVE
MUTING
EMPHASIS
ON
OFF
【HEADPHONE BOARD(1/2)】
J902
HEADPHONES
CN27
(1/5)
VR901-1,2
20k-B
LEVEL
(HEADPHONES)
IC510
NJM4560D-D
HEADPHONE AMP
T501
X502
35.002MHz
CLOCK BUFFER
DISCHARGE DRIVER (L)
DISCHARGE DRIVER (R)
256:1 CONSTANT CURRENT SOURCE
DC BIAS
DCL
DCR
I OUT
I SET
AGND
D GND
DGND
AVEE
0.028μSEC
0.28Vp-p
0.22Vp-p
22.5μSEC
Q603 2SD880
Q602 2SD809
IC601 CX10035
REG
RIPPLE FILTER
REFERENCE VOLTAGE
STARTER
Q604
2SB731
REG.
Q601
2SB731
REG.
Q606
2SC2458
RESET SWITCH
D615
ISS119
D605-608
10DF2
RECT
D601-604
31DQ5
RECT
T901
POWER TRANSFORMER
AEP MODEL
【POWER SW BOARD】
S901
POWER
AC IN
220V 50/60Hz
AC OUTLET
UNSWITCHED 100W MAX
UK MODEL
【POWER SW BOARD】
S901-1
S901-2
AC IN
240V 50/60Hz
AC OUTLET
SWITCHED 100W MAX
E MODEL
【SPARK KILLER BOARD】
VOLTAGE SELECTOR
(INTERNAL CONNECTION)
AC OUTLET
UNSWITCHED 100W 60Hz
AC IN
* NOT REPLACEABLE: BUILT IN TRANSFORMER
SELECT POSITION
110V
120V
220V
240V
Q605 2SD774
REG.
D613,614
ISS119
TO INDICATION BOARD
10
9
TO RF BOARD
CN12
D612
HZ273L
D609-611
10E2
D616
RD5.1EB1
* NOT REPLACEABLE: BUILT IN TRANSFORMER

SECTION 6
EXPLODED VIEWS AND PARTS LIST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F902
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E model
S901
C903
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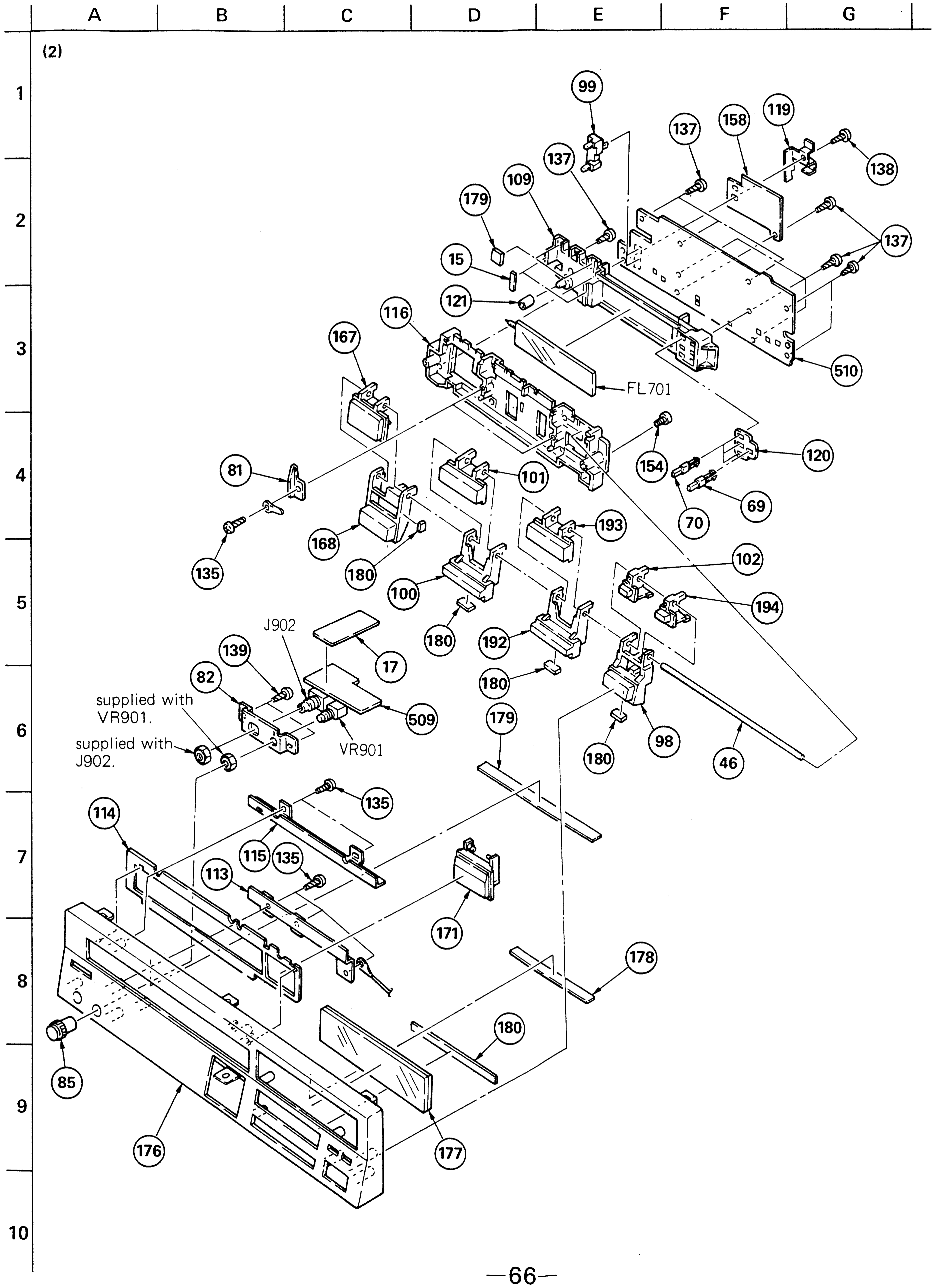
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J902
17
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180
supplied with VR901.
supplied with J902.
509
VR901
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135
114
115
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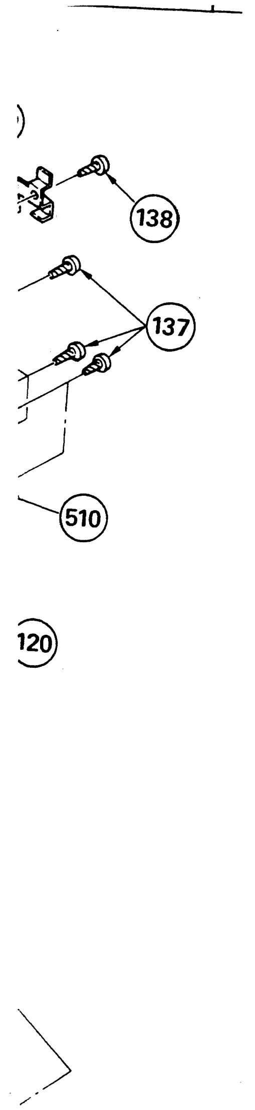

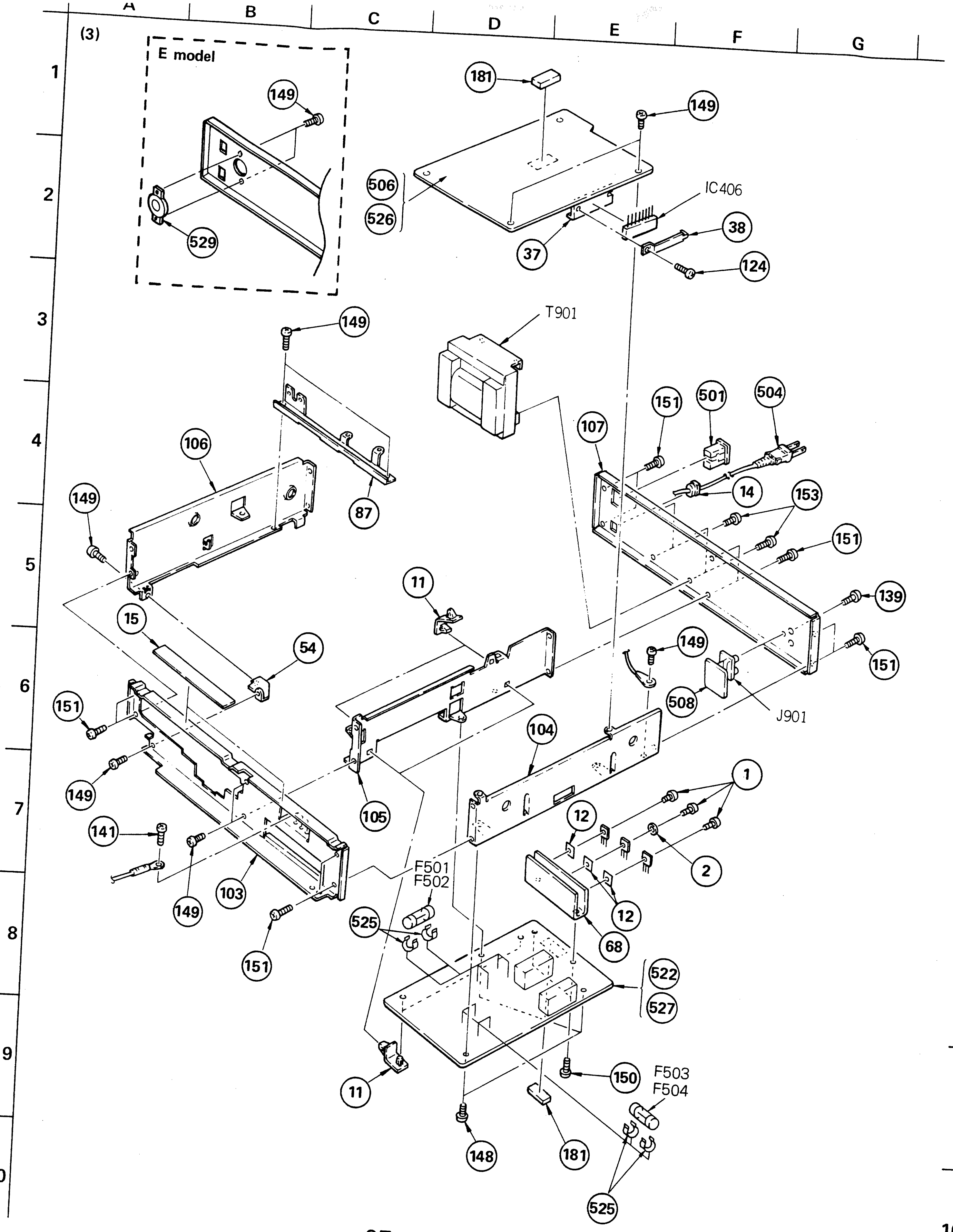
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E model
IC406
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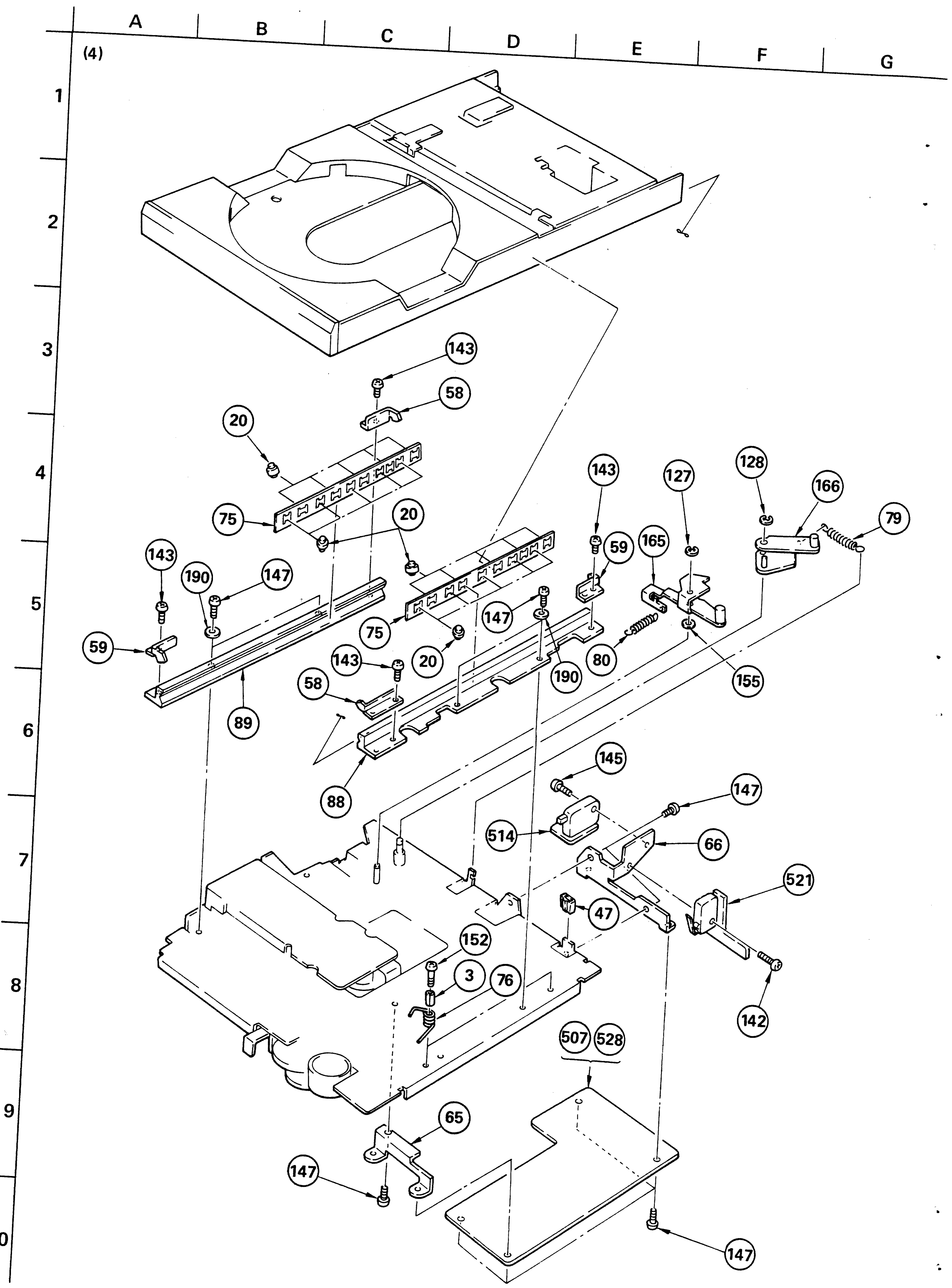
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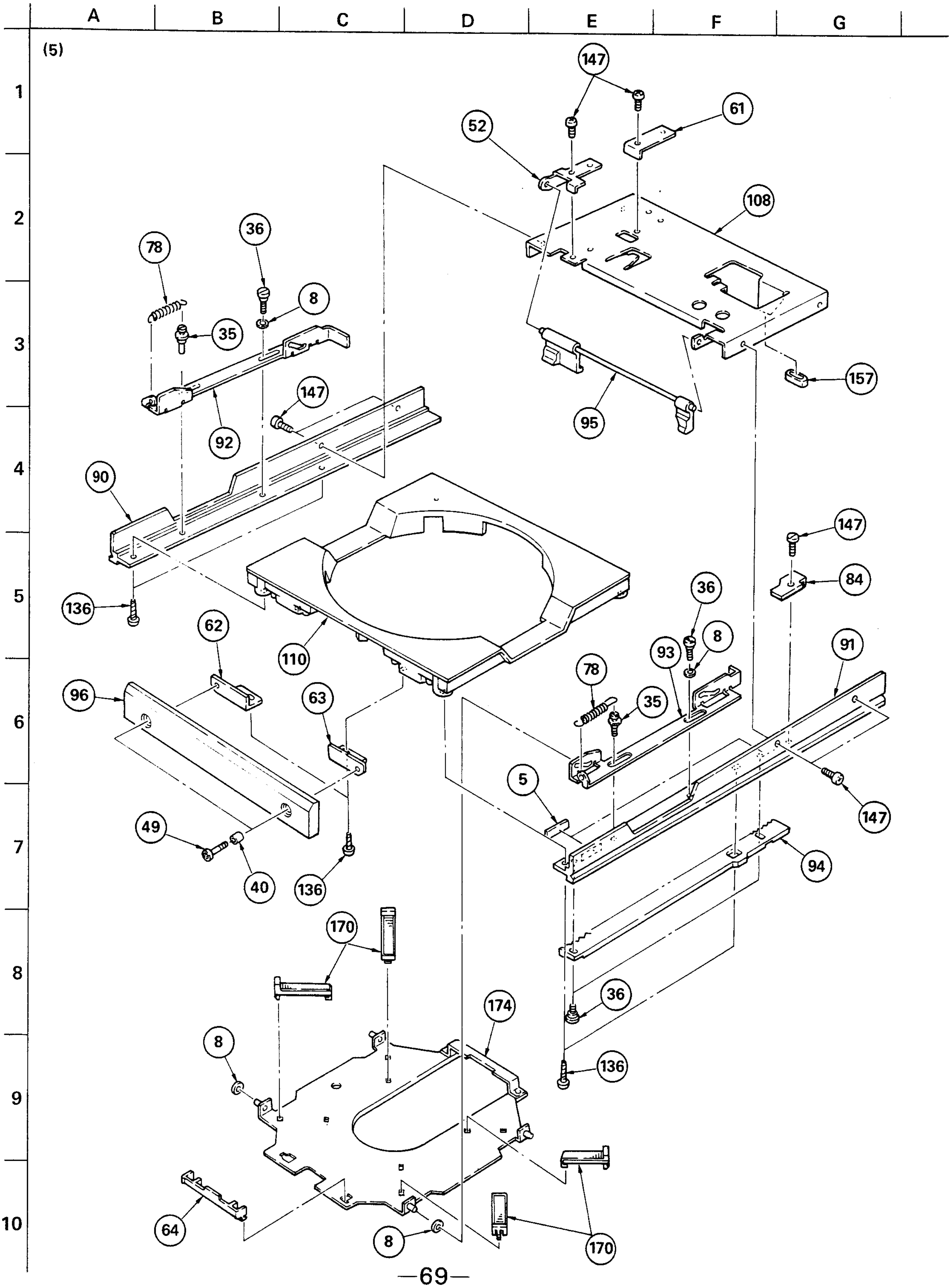
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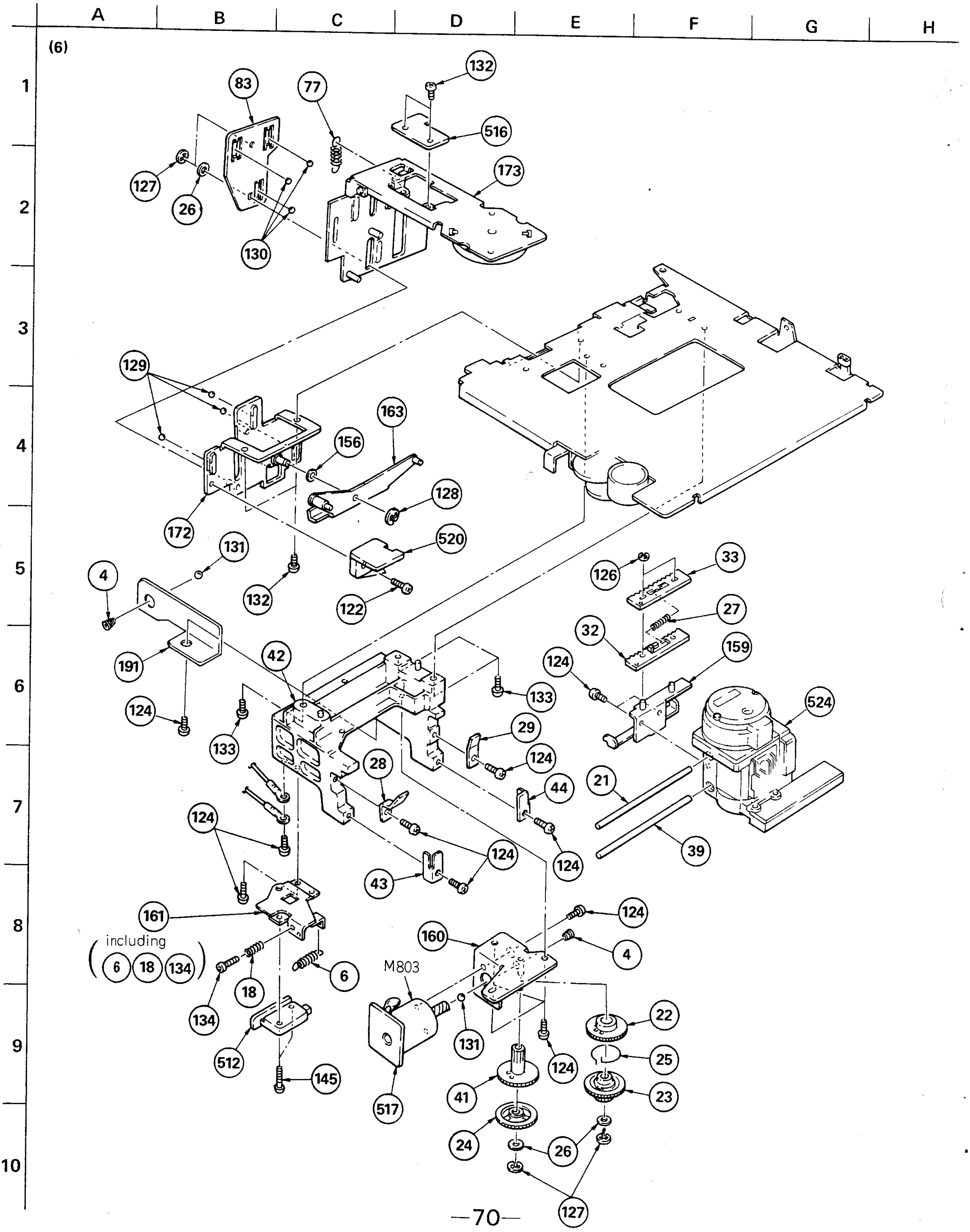
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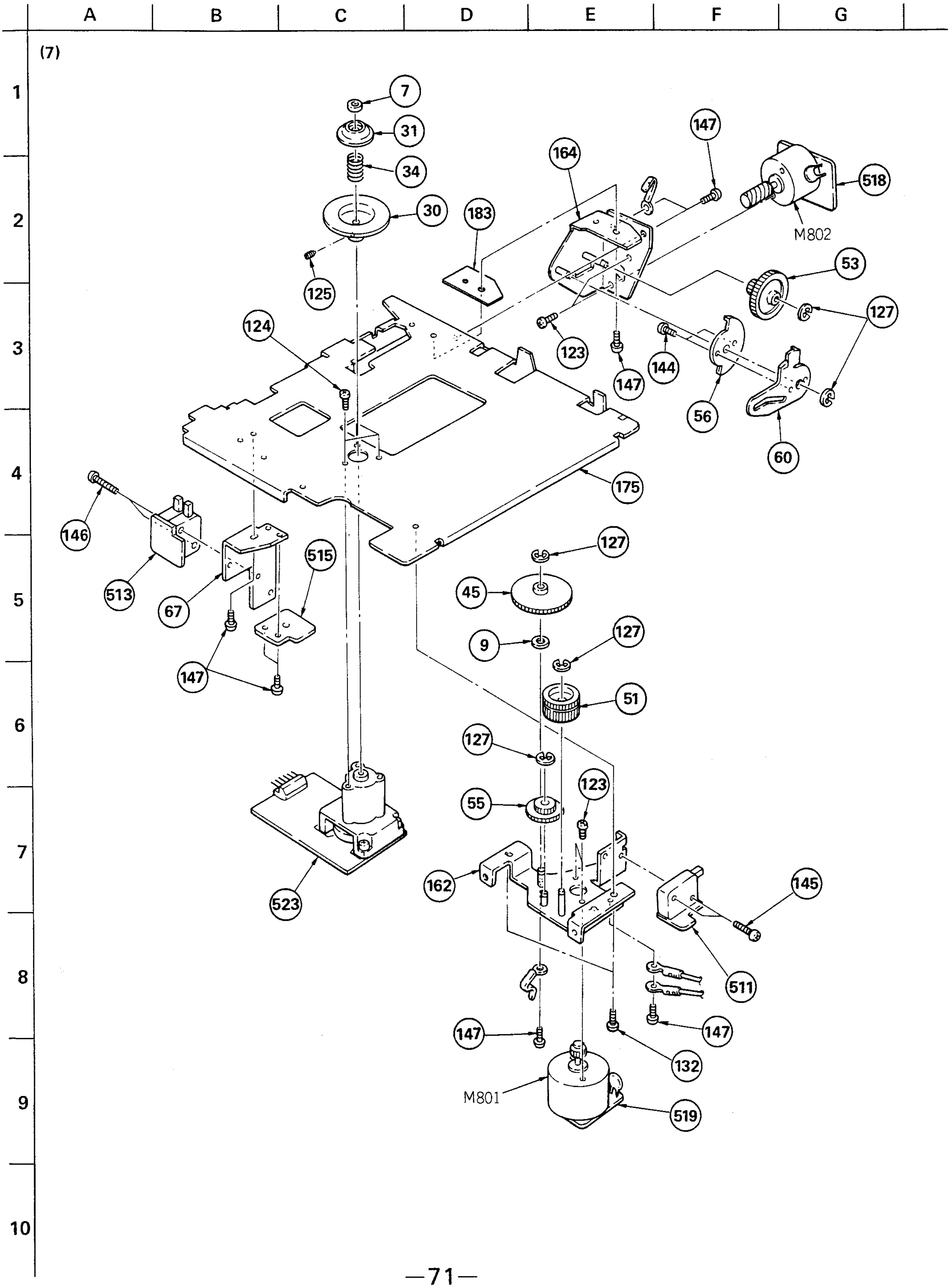
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GENERAL SECTION

No.	Part No.	Description
1	2-259-121-11	SCREW, TR
2	2-371-561-00	BUSHING (P), INSULATING
3	♠;3-312-438-00	SPACER
4	3-489-073-00	SCREW, THRUST
5	3-545-659-00	CUSHION, SPEAKER
6	3-548-124-00	SPRING, TENSION
7	3-558-708-21	WASHER, STOPPER
8	3-701-439-11	WASHER
9	3-701-441-21	WASHER
10	3-703-710-01	STICKER, SONY SYMBOL (12)
11	♠;3-701-832-00	HINGE, CIRCUIT BOARD
12	3-703-037-00	INSULATOR, TO-220
13	4-902-136-11	SCREW (+BVTT M3S)
14	3-703-244-00	(AEP,UK)....BUSHING, CORD
14	3-703-571-11	(E).........BUSHING, CORD
15	3-831-441-11	COVER
16	3-831-441-XX	CUSHION
17	3-846-068-00	SPACER
18	4-836-836-00	SPRING, COMPRESSION
19	4-866-342-00	JOINT (B), KNOB
20	4-884-506-00	ROLLER
21	4-884-509-00	SHAFT, SLIDE
22	4-884-510-00	GEAR (A)
23	4-884-511-00	GEAR (B)
24	4-884-512-00	GEAR (D)
25	4-884-513-00	SPRING (A)
26	4-884-514-00	WASHER
27	4-884-515-00	SPRING (RACK), COMPRESSION
28	4-884-516-00	RETAINER (LEFT), SLIDE SHAFT
29	4-884-517-00	RETAINER (RIGHT), SLIDE SHAFT
30	4-884-554-00	PULLEY, DISK
31	4-884-555-00	CAP, CENTERING
32	4-884-558-00	RACK (A)
33	4-884-559-00	RACK (B)
34	4-884-560-00	SPRING
35	4-884-561-00	SHAFT (A), CAM LEVER, UP & DOWN
36	4-884-562-00	SHAFT (B), CAM LEVER, UP & DOWN
37	♠;4-884-613-00	HEAT SINK (SMALL)
38	♠;4-884-614-00	HOLDER, IC
39	4-884-621-00	SHAFT (2), SLIDE
40	4-884-635-00	(BLACK).....BASE, ORNAMENTAL
40	4-884-635-11	(SILVER-A,SILVER-B)...BASE, ORNAMENTAL
41	4-884-654-00	GEAR (C)
42	4-884-664-00	BASE, OP
43	4-884-698-00	RETAINER(LOWER)(2), SLIDE SHAFT

GENERAL SECTION

No.	Part No.	Description
44	4-884-699-00	RETAINER(LOWER)(1), SLIDE SHAFT
45	4-885-816-00	GEAR (D), LOADING
46	♠;4-887-146-00	SHAFT, BUTTON
47	4-887-175-00	RUBBER, STOPPER
48	4-889-321-21	(SILVER-A,SILVER-B)...SCREW
48	4-889-321-31	(BLACK)....SCREW
49	7-683-412-05	(BLACK)....BOLT, HEXAGON SOCKET 2.6X6
49	4-901-727-00	(SILVER-A,SILVER-B)...BOLT (M2.6), HOLE, HEXAGON
50	4-902-130-00	(AEP)...LABEL, MODEL NUMBER (AEP1)
50	4-902-132-01	(UK)....LABEL, MODEL NUMBER (UK)
50	4-902-133-01	(E).....LABEL, MODEL NUMBER (E1/E2)
51	4-902-002-00	GEAR (A), LOADING
52	♠;4-902-009-00	RETAINER, SHAFT
53	4-902-010-00	GEAR (B), CHUCKING
54	♠;4-902-011-00	REINFORCEMENT, FRAME
55	4-902-012-00	GEAR (B), LOADING
56	4-902-014-00	GEAR (A), CHUCKING
57	4-902-017-00	LEG, RUBBER
58	♠;4-902-018-00	PLATE (A), STOPPER, ROLLER
59	♠;4-902-019-00	PLATE (B), STOPPER, ROLLER
60	♠;4-902-020-00	PLATE, CAM, CHUCKING
61	♠;4-902-028-00	PLATE, LOCK
62	♠;4-902-033-00	STOPPER (LEFT), ORNAMENT, TABLE
63	♠;4-902-034-00	STOPPER (RIGHT), ORNAMENT, TABLE
64	4-902-035-00	GUIDE, DISK PLATE
65	♠;4-902-037-00	STOPPER, RELAY PC BOARD
66	♠;4-902-038-00	BRACKET (B), MICRO SWITCH
67	♠;4-902-039-00	BRACKET (A), MICRO SWITCH
68	♠;4-902-040-00	HEAT SINK (LARGE)
69	4-902-044-01	BUTTON, REPEAT
70	4-902-044-11	BUTTON, REPEAT
71	♠;4-902-046-00	ARM, POWER SWITCH
72	♠;4-902-047-00	SHAFT (B), ARM, POWER SWITCH
73	♠;4-902-048-00	SHAFT (A), ARM, POWER SWITCH
74	♠;4-902-049-00	PLATE, FULCRUN, ARM, POWER SWITCH
75	4-902-128-00	RETAINER (A)
76	4-902-052-00	SPRING (D)
77	4-902-053-00	SPRING, TENSION
78	4-902-054-00	SPRING, TENSION
79	4-902-055-00	SPRING, TENSION
80	4-902-056-00	SPRING, TENSION
81	♠;4-902-057-00	RETAINER, BUTTON SHAFT
82	♠;4-902-058-00	HOLDER, JACK
83	4-902-064-00	SPRING
84	♠;4-902-065-00	PLATE, STOPPER

NOTE:

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- Items marked " ♠ " are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- Due to standardization, parts with part numbers (Δ-ΔΔΔ-ΔΔΔ-XX or Δ-ΔΔΔΔ-ΔΔΔ-X) may be different from those used in the set.

CAPACITORS:
MF:μF, PF:μμF.

RESISTORS
· All resistors are in ohms.
· F : nonflammable

COILS
· MMH : mH, UH : μH

SEMICONDUCTORS
In each case, U : μ, for example:
UA···: μA···, UPA···: μPA···, UPC···: μPC,
UPD···: μPD···

GENERAL SECTION

No.	Part No.	Description
85	4-902-067-01	(SILVER-A)...KNOB, CONTROL
85	4-902-067-11	(BLACK)......KNOB, CONTROL
85	4-902-067-21	(SILVER-B)...KNOB, CONTROL
86	♠;4-902-071-00	LEVER, POWER SWITCH
87	♠;4-902-072-00	BRACKET, POWER PC BOARD
88	♠;4-902-073-00	RAIL (RIGHT), FIXED
89	♠;4-902-074-00	RAIL (LEFT), FIXED
90	4-902-077-00	RAIL (LEFT)
91	4-902-078-00	RAIL (RIGHT)
92	4-902-080-00	PLATE (LEFT), CAM, DISK
93	4-902-081-00	PLATE (RIGHT), CAM, DISK
94	4-902-082-00	RACK, LOADING
95	4-902-083-00	ARM, FUNCTION
96	4-902-084-01	(SILVER-A,SILVER-B)....PLATE, ORNAMENTAL, DISK TABLE
96	4-902-084-11	(BLACK)....PLATE, ORNAMENTAL, DISK TABLE
97	♠;4-902-085-00	COVER, LOADING
98	4-902-088-01	(SILVER-A)...BUTTON, RESET
98	4-902-088-11	(BLACK)......BUTTON, RESET
98	4-902-088-21	(SILVER-B)...BUTTON, RESET
99	♠;4-902-090-00	GUIDE, LED
100	4-902-091-01	(SILVER-A)...BUTTON, FF
100	4-902-091-11	(BLACK)......BUTTON, FF
100	4-902-091-21	(SILVER-B)...BUTTON, FF
101	4-902-092-01	(SILVER-A)...BUTTON, N
101	4-902-092-11	(BLACK)......BUTTON, N
101	4-902-092-21	(SILVER-B)...BUTTON, N
102	4-902-093-01	(SILVER-A)...BUTTON, INDEX
102	4-902-093-11	(BLACK)......BUTTON, INDEX
102	4-902-093-21	(SILVER-B)...BUTTON, INDEX
103	♠;4-902-094-00	PANEL, SUB
104	♠;4-902-095-00	ANGLE (RIGHT), SIDE PLATE
105	♠;4-902-096-00	ANGLE (INNER), SIDE PLATE
106	♠;4-902-097-00	ANGLE (LEFT), SIDE PLATE
107	♠;4-902-098-31	(AEP)....PLATE, JACK
107	♠;4-902-098-41	(UK).....PLATE, JACK
107	♠;4-902-098-51	(E)......PLATE, JACK
108	♠;4-902-100-00	REINFORCEMENT, RAIL
109	♠;4-902-101-00	HOLDER, INDICATION TUBE
110	4-902-102-00	TABLE, DISK
111	4-902-103-00	(SILVER-A,SILVER-B)...CASE
111	4-902-103-11	(BLACK).....CASE
112	♠;4-902-104-00	PLATE, BOTTOM
113	♠;4-902-106-00	RETAINER (B), ORNAMENTAL PLATE
114	4-902-107-00	(SILVER-A,SILVER-B)...PLATE, ORNAMENTAL, LOADING
114	4-902-107-11	(BLACK)....PLATE, ORNAMENTAL, LOADING

GENERAL SECTION

No.	Part No.	Description
115	♠;4-902-108-00	RETAINER (A), ORNAMENTAL PLATE
116	4-902-109-00	HOLDER, CONTROL BUTTON
117	♠;4-902-111-00	REINFORCEMENT, TABLE
118	♠;4-902-112-01	SPACER, INSULATING
119	♠;4-902-120-00	RETAINER, WIRE
120	♠;4-902-121-00	GUIDE, REPEAT BUTTON
121	4-902-124-00	TUBE, LED
122	7-621-255-50	SCREW +P 2X8
123	7-621-259-15	SCREW +P 2.6X3
124	7-621-284-10	SCREW +P 2.6X5
125	7-621-734-09	SET-SCT, HEX. 2.6X3
126	7-624-104-04	STOP RING 2.0, TYPE -E
127	7-624-106-04	STOP RING 3.0, TYPE -E
128	7-624-108-04	STOP RING 4.0, TYPE -E
129	7-671-113-02	STEAL, BALL 3
130	7-671-113-11	BALL, STEEL
131	7-671-156-01	BALL, STENLESS
132	7-682-144-09	SCREW +P 3X3
133	7-685-145-01	SCREW +P 3X4
134	7-683-415-05	BOLT, HEXAGON SOCKET 2.6X12
135	7-685-133-19	SCREW +P 2.6X6 TYPE2 NON-SLIT
136	7-685-147-29	SCREW +P 3X10 TYPE2 SLIT
137	7-685-535-19	SCREW +BTP 2.6X10 TYPE2 N-S
138	7-685-536-14	SCREW +BTP 2.6X12 TYPE2 N-S
139	7-685-646-19	SCREW +BVTP 3X8 TYPE2 N-S
140	7-685-750-01	SCREW +PTT 3X5 (S)
141	7-685-751-04	SCREW +PTT 3X6 (S)
142	7-685-855-01	+BVTT 2X10 (S)
143	7-685-860-04	SCREW +BVTT 2.6X4 (S)
144	7-685-861-09	SCREW +BVTT 2.6X5 (S)
145	7-685-864-01	SCREW +BVTT 2.6X10 (S)
146	7-685-867-01	SCREW +BVTT 2.6X16 (S)
147	7-685-870-01	SCREW +BVTT 3X5 (S)
148	7-685-871-01	SCREW +BVTT 3X6 (S)
149	7-685-871-09	SCREW +BVTT 3X6 (S)
150	7-685-872-01	SCREW +BVTT 3X8 (S)
151	7-685-872-09	SCREW +BVTT 3X8 (S)
152	7-685-873-01	SCREW +BVTT 3X10 (S)
153	7-685-880-09	SCREW +BVTT 4X6 (S)
154	7-685-534-24	SCREW +BTP 2.6X8 TYPE2 N-S
155	7-688-004-11	W 4, MIDDLE
156	7-688-005-01	W 5, SMALL
157	9-911-839-XX	RUBBER (A)
158	9-911-863-XX	COVER, INDICATION PC BOARD
159	X-4884-501-0	HOLDER ASSY, RACK

NOTE:

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CAPACITORS:
MF:μF, PF:μμF.

RESISTORS
· All resistors are in ohms.
· F : nonflammable

COILS
· MMH : mH, UH : μH

SEMICONDUCTORS
In each case, U : μ, for example:
UA···: μA···, UPA···: μPA···, UPC···: μPC,
UPD···: μPD···

GENERAL SECTION

No.	Part No.	Description
160	♠;X-4884-502-0	HOLDER ASSY, MOTOR
161	♠;X-4884-513-0	HOLDER ASSY, SWITCH
162	♠;X-4902-001-0	PLATE ASSY, LOADING
163	X-4902-002-0	LEVER ASSY, CHUCKING
164	♠;X-4902-003-0	HOLDER ASSY, CHUCKING MOTOR
165	X-4902-004-0	LEVER ASSY, UP AND DOWN
166	♠;X-4902-005-0	LEVER ASSY, LOCK
167	X-4902-006-0	(SILVER-A)...BUTTON ASSY, PLAY
167	X-4902-020-0	(BLACK)......BUTTON ASSY, PLAY
167	X-4902-028-1	(SILVER-B)...BUTTON ASSY, PLAY
168	X-4902-007-0	(SILVER-A)...BUTTON ASSY, PAUSE
168	X-4902-021-0	(BLACK)......BUTTON ASSY, PAUSE
168	X-4902-029-1	(SILVER-B)...BUTTON ASSY, PAUSE
169	X-4902-008-0	(SILVER-A,SILVER-B)...KNOB ASSY, POWER
169	X-4902-023-0	(BLACK)....KNOB ASSY, POWER
170	X-4902-009-0	RETAINER ASSY, DISK
171	X-4902-010-0	(SILVER-A,SILVER-B)...BUTTON ASSY, OPEN/CLOSE
171	X-4902-022-0	(BLACK)....BUTTON ASSY, OPEN/CLOSE
172	♠;X-4902-012-0	SUPPORT ASSY, CHUCKING
173	X-4902-013-0	ARM ASSY, CHUCKING
174	X-4902-014-0	PLATE ASSY, DISK
175	♠;X-4902-015-0	CHASSIS ASSY, MECHANICAL
176	X-4902-016-1	(SILVER-A)...PANEL ASSY, FRONT
176	X-4902-025-1	(BLACK)......PANEL ASSY, FRONT
176	X-4902-030-1	(SILVER-B)...PANEL ASSY, FRONT
177	X-4902-017-1	PANEL ASSY, TRANSPARENT
178	♠;4-902-126-00	REINFORCEMENT (RIGHT), PANEL
179	♠;4-902-127-00	REINFORCEMENT (LEFT), PANEL
180	9-911-815-01	CUSHION
181	9-911-843-XX	CUSHION
182	4-885-831-00	LABEL, CAUTION
183	4-902-129-00	SPACER, HOLDER
184	♠;3-701-690-00	(UK)...LABEL (MADE IN JAPAN)
185	3-703-043-21	(UK)...LABEL, CAUTION, MAIN
186	4-875-455-01	(AEP)...COVER (DIA. 20), CAPACITOR
187	4-885-839-00	LABEL, APERTURE
188	4-885-843-02	LABEL, CAUTION, LASER
189	4-885-838-00	LABEL, CLASS 1
190	7-688-003-11	W 3, MIDDLE
191	♠;4-902-138-01	RETAINER, THRUST

GENERAL SECTION

No.	Part No.	Description
192	4-902-091-01	(SILVER-A)...BUTTON, FF
192	4-902-091-11	(BLACK)......BUTTON, FF
192	4-902-091-31	(SILVER-B)...BUTTON, FF
193	4-902-092-01	(SILVER-A)...BUTTON, N
193	4-902-092-11	(BLACK)......BUTTON, N
193	4-902-092-31	(SILVER-B)...BUTTON, N
194	4-902-093-01	(SILVER-A)...BUTTON, INDEX
194	4-902-093-11	(BLACK)......BUTTON, INDEX
194	4-902-093-31	(SILVER-B)...BUTTON, INDEX

ACCESSORY & PACKING MATERIAL

No.	Part No.	Description
231	⚠.1-526-565-00	(E)....AC PLUG ADAPTOR
232	1-551-315-00	CORD, CONNECTION
233	⚠.1-564-085-11	(UK)...AC PLUG
234	3-701-619-00	BAG, POLYETHYLENE, STANDARD
235	3-701-630-00	BAG, POLYETHYLENE
236	3-773-593-11	(UK,E)...MANUAL, INSTRUCTION
237	3-773-593-41	(AEP)....MANUAL, INSTRUCTION
238	3-795-629-11	(AEP).....INSTRUCTION
239	4-859-064-00	SHEET, PROTECTION
240	4-902-115-00	CUSHION (RIGHT), UPPER
241	4-902-116-00	CUSHION (LEFT), UPPER
242	4-902-117-00	CUSHION (RIGHT), LOWER
243	4-902-118-00	CUSHION (LEFT), LOWER
244	4-902-134-00	INDIVIDUAL CARTON
245	X-4884-523-0	CLEANER ASSY, DISK

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- MMH : mH, UH : μH

SEMICONDUCTORS
In each case, U : μ, for example:
UA···: μA···, UPA···: μPA···, UPC···: μPC,
UPD···: μPD···

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

ELECTRICAL PARTS

Ref.No.	Part No.	Description			
501	⚠.1-526-609-00	(E).....OUTLET, AC			
501	⚠.1-526-694-00	(AEP)...OUTLET, AC			
501	⚠.1-526-751-00	(UK)....OUTLET, AC			
502	♠;1-535-116-00	TERMINAL			
503	♠;1-535-118-00	TERMINAL			
504	⚠.1-555-795-00	(AEP)....CORD, POWER			
504	⚠.1-556-035-00	(UK).....CORD, POWER			
504	⚠.1-556-091-00	(E)......CORD, POWER			
505	♠;1-535-416-00	TERMINAL			
506	♠;1-611-145-00	PC BOARD, SERVO			
507	♠;1-611-146-00	PC BOARD, RF			
508	♠;1-611-147-00	PC BOARD, LINE OUT			
509	♠;1-611-148-00	PC BOARD, HEADPHONE			
510	♠;1-611-149-00	PC BOARD, INDICATION			
511	♠;1-611-150-00	PC BOARD, LOADING OUT SWITCH			
512	♠;1-611-151-00	PC BOARD, LIMIT SWITCH			
513	♠;1-611-152-00	PC BOARD, LOADING IN SWITCH			
514	♠;1-611-153-00	PC BOARD, LASER SWITCH			
515	♠;1-611-154-00	PC BOARD, PHOTO TRANSISTOR			
516	♠;1-611-155-00	PC BOARD, DISK DETECTION LED			
517	♠;1-611-156-00	PC BOARD, SLED MOTOR			
518	♠;1-611-157-00	PC BOARD, CHUCKING MOTOR			
519	♠;1-611-158-00	PC BOARD, LOADING MOTOR			
520	♠;1-611-159-00	PC BOARD, CHUCKING/LOADING SW			
521	♠;1-611-160-00	PC BOARD, CHUCKING SWITCH			
522	♠;1-611-162-00	PC BOARD, AUDIO			
523	8-838-039-01	MOTOR, DC (BHR-2600A)(DISC MOTOR)			
524	8-848-001-01	KSS-100A (OPTICAL PICK-UP BLOCK)			
525	⚠.1-533-131-00	HOLDER, FUSE			
526	♠;A-4619-221-A	MOUNTED PCB, SERVO			
527	♠;A-4651-010-A	MOUNTED PCB, AUDIO			
528	♠;A-4688-002-A	MOUNTED PCB, RF			
529	⚠.1-526-576-41	(E).....SELECTOR, POWER VOLTAGE			
530	♠;1-535-135-00	(AEP)...BASE POST 14MM (10MM PITCH)			
531	♠;1-535-136-00	(UK)....BASE POST 14MM (10MM PITCH)			
532	♠;1-611-161-00	(E).....PC BOARD, SPARK KILLER			
533	♠;1-611-163-00	(AEP)...PC BOARD, POWER SWITCH			
533	♠;1-611-164-00	(UK)....PC BOARD, POWER SWITCH			
C101	1-161-267-00	CERAMIC	47PF	5%	50V
C102	1-161-267-00	CERAMIC	47PF	5%	50V
C103	1-161-259-00	CERAMIC	10PF	5%	50V
C104	1-161-259-00	CERAMIC	10PF	5%	50V
C105	1-123-305-00	ELECT	33MF	20%	10V
C106	1-123-305-00	ELECT	33MF	20%	10V

ELECTRICAL PARTS

Ref.No.	Part No.	Description			
C107	1-161-264-00	CERAMIC	27PF	5%	50V
C108	1-161-264-00	CERAMIC	27PF	5%	50V
C109	1-161-265-00	CERAMIC	33PF	5%	50V
C111	1-161-255-00	CERAMIC	4.7PF	10%	50V
C112	1-161-330-00	CERAMIC	0.01MF	30%	25V
C113	1-123-305-00	ELECT	33MF	20%	10V
C114	1-161-330-00	CERAMIC	0.01MF	30%	25V
C115	1-123-333-00	ELECT	100MF	20%	16V
C116	1-123-465-00	ELECT	220MF	20%	6.3V
C201	1-130-624-00	FILM	0.022MF	5%	50V
C202	1-130-633-00	FILM	0.12MF	5%	50V
C203	1-161-323-00	CERAMIC	0.001MF	10%	50V
C204	1-123-305-00	ELECT	33MF	20%	10V
C205	1-161-330-00	CERAMIC	0.01MF	30%	25V
C206	1-161-327-00	CERAMIC	0.0033MF	30%	50V
C207	1-130-626-00	FILM	0.033MF	5%	50V
C208	1-161-271-00	CERAMIC	100PF	5%	50V
C209	1-108-354-00	MYLAR	0.0039MF	10%	50V
C210	1-123-305-00	ELECT	33MF	20%	10V
C211	1-130-620-00	FILM	0.01MF	5%	50V
C212	1-161-375-00	CERAMIC	0.0022MF	20%	50V
C213	1-161-375-00	CERAMIC	0.0022MF	20%	50V
C214	1-102-645-00	CERAMIC	33PF	5%	50V
C215	1-161-315-00	CERAMIC	220PF	10%	50V
C216	1-102-645-00	CERAMIC	33PF	5%	50V
C217	1-123-305-00	ELECT	33MF	20%	10V
C218	1-107-306-00	MICA	180PF	5%	100V
C219	1-106-188-00	MYLAR	0.0047MF	5%	100V
C220	1-123-305-00	ELECT	33MF	20%	10V
C221	1-123-305-00	ELECT	33MF	20%	10V
C222	1-107-292-00	MICA	47PF	5%	100V
C223	1-107-292-00	MICA	47PF	5%	100V
C224	1-123-305-00	ELECT	33MF	20%	10V
C225	1-123-305-00	ELECT	33MF	20%	10V
C226	1-123-305-00	ELECT	33MF	20%	10V
C227	1-123-305-00	ELECT	33MF	20%	10V
C301	1-102-517-00	CERAMIC	30PF	5%	50V
C302	1-102-517-00	CERAMIC	30PF	5%	50V
C303	1-123-356-00	ELECT	10MF	20%	16V
C304	1-123-356-00	ELECT	10MF	20%	16V
C305	1-123-356-00	ELECT	10MF	20%	16V
C306	1-161-315-00	CERAMIC	220PF	10%	50V
C401	1-130-188-00	FILM	0.01MF	5%	100V
C402	1-130-626-00	FILM	0.033MF	5%	50V
C403	1-130-620-00	FILM	0.01MF	5%	50V

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- Due to standardization, parts with part numbers (Δ-ΔΔΔ-ΔΔΔ-XX or Δ-ΔΔΔΔ-ΔΔΔ-X) may be different from those used in the set.

CAPACITORS:
MF:μF, PF:μμF.

RESISTORS
- All resistors are in ohms.
- F : nonflammable

COILS
- MMH : mH, UH : μH

SEMICONDUCTORS
In each case, U : μ, for example:
UA···: μA···, UPA···: μPA···, UPC···: μPC,
UPD···: μPD···

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ELECTRICAL PARTS

No.	Part No.	Description			
04	1-123-380-00	ELECT	1MF	20%	50V
05	1-123-307-00	ELECT	100MF	20%	6.3V
06	1-130-620-00	FILM	0.01MF	5%	50V
07	1-130-624-00	FILM	0.022MF	5%	50V
08	1-130-632-00	FILM	0.1MF	5%	50V
09	1-123-330-00	ELECT	22MF	20%	16V
10	1-161-319-00	CERAMIC	470PF	10%	50V
11	1-123-305-00	ELECT	33MF	20%	10V
12	1-123-306-00	ELECT	47MF	20%	10V
13	1-123-306-00	ELECT	47MF	20%	10V
14	1-124-184-00	ELECT	3.3MF	20%	50V
15	1-130-626-00	FILM	0.033MF	5%	50V
16	1-161-259-00	CERAMIC	10PF	5%	50V
17	1-108-577-00	MYLAR	0.0082MF	5%	50V
18	1-161-271-00	CERAMIC	100PF	5%	50V
19	1-161-323-00	CERAMIC	0.001MF	10%	50V
20	1-130-624-00	FILM	0.022MF	5%	50V
21	1-123-608-00	ELECT	0.22MF	20%	50V
22	1-130-623-00	FILM	0.018MF	5%	50V
23	1-106-188-00	MYLAR	0.0047MF	5%	100V
24	1-130-624-00	FILM	0.022MF	5%	50V
25	1-130-636-00	FILM	0.22MF	5%	50V
26	1-124-184-00	ELECT	3.3MF	20%	50V
27	1-161-263-00	CERAMIC	22PF	5%	50V
28	1-161-323-00	CERAMIC	0.001MF	10%	50V
29	1-161-323-00	CERAMIC	0.001MF	10%	50V
30	1-130-628-00	FILM	0.047MF	5%	50V
31	1-161-330-00	CERAMIC	0.01MF	30%	25V
34	1-123-356-00	ELECT	10MF	20%	16V
35	1-123-306-00	ELECT	47MF	20%	10V
36	1-123-332-00	ELECT	47MF	20%	16V
37	1-123-306-00	ELECT	47MF	20%	10V
38	1-123-332-00	ELECT	47MF	20%	16V
39	1-130-632-00	FILM	0.1MF	5%	50V
40	1-123-306-00	ELECT	47MF	20%	10V
41	1-102-074-00	CERAMIC	0.001MF	10%	50V
42	1-123-318-00	ELECT	33MF	20%	16V
43	1-123-318-00	ELECT	33MF	20%	16V
44	1-101-004-00	CERAMIC	0.01MF		50V
45	1-101-004-00	CERAMIC	0.01MF		50V
01	1-130-628-00	FILM	0.047MF	5%	50V
02	1-123-299-00	ELECT	1000MF	20%	6.3V
03	1-131-386-00	TANTALUM	33MF	10%	6.3V
04	1-102-947-00	CERAMIC	10PF	5%	50V
05	1-131-386-00	TANTALUM	33MF	10%	6.3V

ELECTRICAL PARTS

Ref.No.	Part No.	Description			
C506	1-131-386-00	TANTALUM	33MF	10%	6.3V
C507	1-131-386-00	TANTALUM	33MF	10%	6.3V
C508	1-102-965-00	CERAMIC	39PF	5%	50V
C509	1-102-965-00	CERAMIC	39PF	5%	50V
C511	1-102-074-00	CERAMIC	0.001MF	10%	50V
C512	1-131-450-00	TANTALUM	1MF	20%	50V
C513	1-123-305-00	ELECT	33MF	20%	10V
C514	1-131-450-00	TANTALUM	1MF	20%	50V
C515	1-102-953-00	CERAMIC	18PF	5%	50V
C516	1-102-074-00	CERAMIC	0.001MF	10%	50V
C517	1-123-318-00	ELECT	33MF	20%	10V
C518	1-123-305-00	ELECT	33MF	20%	10V
C519	1-123-318-00	ELECT	33MF	20%	10V
C521	1-104-231-00	POLYSTYRENE	0.001MF	5%	500V
C522	1-104-231-00	POLYSTYRENE	0.001MF	5%	500V
C523	1-123-681-00	ELECT	47MF	20%	16V
C524	1-123-681-00	ELECT	47MF	20%	16V
C525	1-131-450-00	TANTALUM	1MF	20%	50V
C526	1-131-450-00	TANTALUM	1MF	20%	50V
C527	1-107-167-00	MICA	75PF	5%	500V
C528	1-107-167-00	MICA	75PF	5%	500V
C529	1-130-960-00	FILM	0.01MF	2%	100V
C530	1-130-960-00	FILM	0.01MF	2%	100V
C531	1-124-336-00	ELECT	10MF	20%	100V
C532	1-124-336-00	ELECT	10MF	20%	100V
C533	1-123-306-00	ELECT	47MF	20%	10V
C534	1-123-306-00	ELECT	47MF	20%	10V
C535	1-131-450-00	TANTALUM	1MF	20%	50V
C536	1-131-450-00	TANTALUM	1MF	20%	50V
C537	1-131-450-00	TANTALUM	1MF	20%	50V
C538	1-131-450-00	TANTALUM	1MF	20%	50V
C539	1-107-310-00	MICA	220PF	5%	500V
C540	1-107-310-00	MICA	220PF	5%	500V
C601	⚠.1-123-339-00	ELECT	3300MF	20%	25V
C602	⚠.1-123-339-00	ELECT	3300MF	20%	25V
C603	⚠.1-123-495-00	ELECT	220MF	20%	25V
C604	⚠.1-123-495-00	ELECT	220MF	20%	25V
C605	1-123-332-00	ELECT	47MF	20%	16V
C606	⚠.1-123-311-00	ELECT	1000MF	20%	10V
C607	1-123-332-00	ELECT	47MF	20%	16V
C608	⚠.1-123-311-00	ELECT	1000MF	20%	10V
C609	⚠.1-123-311-00	ELECT	1000MF	20%	10V
C610	⚠.1-123-311-00	ELECT	1000MF	20%	10V
C611	⚠.1-123-327-00	ELECT	4700MF	20%	16V
C612	⚠.1-124-078-00	ELECT	2200MF	20%	16V

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- All resistors are in ohms.
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- MMH : mH, UH : μH

SEMICONDUCTORS

In each case, U : μ, for example:
UA···: μA···, UPA···: μPA···, UPC···: μPC,
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ELECTRICAL PARTS

Ref.No.	Part No.	Description			
C613	⚠.1-123-505-00	ELECT	220MF	20%	35V
C614	1-123-359-00	ELECT	47MF	20%	35V
C615	1-123-512-00	ELECT	47MF	20%	50V
C616	1-123-504-00	ELECT	100MF	20%	35V
C617	1-123-380-00	ELECT	1MF	20%	50V
C618	1-123-356-00	ELECT	10MF	20%	50V
C701	1-161-323-00	CERAMIC	0.001MF	10%	50V
C801	1-130-624-00	FILM	0.022MF	5%	50V
C802	1-130-624-00	FILM	0.022MF	5%	50V
C803	1-161-328-00	CERAMIC	0.0047MF	30%	50V
C804	1-102-125-00	CERAMIC	0.0047MF	10%	50V
C805	1-102-125-00	CERAMIC	0.0047MF	10%	50V
C806	1-102-125-00	CERAMIC	0.0047MF	10%	50V
C901	1-102-144-00	CERAMIC	470PF	10%	50V
C902	1-101-005-00	CERAMIC	0.022MF		50V
C903	⚠.1-161-744-00	CERAMIC	0.01MF		
C904	⚠.1-161-744-00	(UK)....CERAMIC	0.01MF		
CNP1	♠;1-560-061-00	PIN, CONNECTOR 3P			
CNP2	♠;1-560-061-00	PIN, CONNECTOR 3P			
CNP3	♠;1-560-061-00	PIN, CONNECTOR 3P			
CNP4	♠;1-560-062-00	PIN, CONNECTOR 4P			
CNP5	♠;1-560-062-00	PIN, CONNECTOR 4P			
CNP6	♠;1-560-060-00	PIN, CONNECTOR 2P			
CNP11	♠;1-560-062-00	PIN, CONNECTOR 4P			
CNP12	♠;1-560-062-00	PIN, CONNECTOR 4P			
CNP13	♠;1-560-063-00	PIN, CONNECTOR 5P			
CNP14	♠;1-560-338-00	PIN, CONNECTOR 7P			
CNP21	♠;1-560-062-00	PIN, CONNECTOR 4P			
CNP22	♠;1-560-063-00	PIN, CONNECTOR 5P			
CNP23	♠;1-560-064-00	PIN, CONNECTOR 6P			
CNP24	♠;1-560-065-00	PIN, CONNECTOR 8P			
CNP25	♠;1-560-061-00	PIN, CONNECTOR 3P			
CNP26	♠;1-560-060-00	PIN, CONNECTOR 2P			
CNP27	♠;1-560-065-00	PIN, CONNECTOR 8P			
CNP31	♠;1-560-063-00	PIN, CONNECTOR 5P			
CNP32	♠;1-560-063-00	PIN, CONNECTOR 5P			
CNP33	♠;1-560-338-00	PIN, CONNECTOR 7P			
CNP34	♠;1-560-061-00	PIN, CONNECTOR 3P			
CNP41	♠;1-560-064-00	PIN, CONNECTOR 6P			
CNP51	♠;1-560-063-00	PIN, CONNECTOR 5P			
CNP52	♠;1-560-064-00	PIN, CONNECTOR 6P			
CNP53	♠;1-560-065-00	PIN, CONNECTOR 8P			
CNP61	♠;1-560-074-00	PIN, CONNECTOR			
CNP71	♠;1-560-064-00	PIN, CONNECTOR 6P			

ELECTRICAL PARTS

Ref.No.	Part No.	Description
D101	8-719-100-29	DIODE RD5.1EB1
D102	8-719-910-22	DIODE HZ12A2L
D201	8-719-911-19	DIODE 1SS119
D202	8-719-911-19	DIODE 1SS119
D203	8-719-911-19	DIODE 1SS119
D204	8-719-911-19	DIODE 1SS119
D205	8-719-911-19	DIODE 1SS119
D206	8-719-911-19	DIODE 1SS119
D207	8-719-911-19	DIODE 1SS119
D208	8-719-911-19	DIODE 1SS119
D209	8-719-911-19	DIODE 1SS119
D210	8-719-923-64	DIODE KV1236
D211	8-719-911-19	DIODE 1SS119
D212	8-719-911-19	DIODE 1SS119
D401	8-719-911-19	DIODE 1SS119
D402	8-719-911-19	DIODE 1SS119
D403	8-719-911-19	DIODE 1SS119
D404	8-719-911-19	DIODE 1SS119
D405	8-719-100-12	DIODE RD2.7EB1
D406	8-719-100-12	DIODE RD2.7EB1
D407	8-719-100-12	DIODE RD2.7EB1
D408	8-719-100-12	DIODE RD2.7EB1
D409	8-719-911-19	DIODE 1SS119
D410	8-719-100-12	DIODE RD2.7EB1
D411	8-719-911-19	DIODE 1SS119
D412	8-719-911-19	DIODE 1SS119
D413	8-719-911-19	DIODE 1SS119
D414	8-719-100-29	DIODE RD5.1EB1
D501	8-719-911-19	DIODE 1SS119
D502	8-719-911-19	DIODE 1SS119
D601	⚠.8-719-200-00	DIODE 31DQ5
D602	⚠.8-719-200-00	DIODE 31DQ5
D603	⚠.8-719-200-00	DIODE 31DQ5
D604	⚠.8-719-200-00	DIODE 31DQ5
D605	⚠.8-719-210-12	DIODE 10DF2
D606	⚠.8-719-210-12	DIODE 10DF2
D607	⚠.8-719-210-12	DIODE 10DF2
D608	⚠.8-719-210-12	DIODE 10DF2
D609	8-719-200-02	DIODE 10E2
D610	8-719-200-02	DIODE 10E2
D611	8-719-200-02	DIODE 10E2
D612	8-719-922-73	DIODE HZ27-3L
D613	⚠.8-719-911-19	DIODE 1SS119
D614	⚠.8-719-911-19	DIODE 1SS119
D615	8-719-911-19	DIODE 1SS119

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ELECTRICAL PARTS

Ref.No.	Part No.	Description			
R307	1-247-839-00	CARBON	2.2K	5%	1/6W
R308	1-247-847-00	CARBON	4.7K	5%	1/6W
R309	1-247-847-00	CARBON	4.7K	5%	1/6W
R310	1-247-847-00	CARBON	4.7K	5%	1/6W
R311	1-247-855-00	CARBON	10K	5%	1/6W
R312	1-247-863-00	CARBON	22K	5%	1/6W
R313	1-247-863-00	CARBON	22K	5%	1/6W
R314	1-247-863-00	CARBON	22K	5%	1/6W
R315	1-247-863-00	CARBON	22K	5%	1/6W
R316	1-247-863-00	CARBON	22K	5%	1/6W
R317	1-247-863-00	CARBON	22K	5%	1/6W
R318	1-247-863-00	CARBON	22K	5%	1/6W
R319	1-247-863-00	CARBON	22K	5%	1/6W
R320	1-247-863-00	CARBON	22K	5%	1/6W
R321	1-247-863-00	CARBON	22K	5%	1/6W
R322	1-247-863-00	CARBON	22K	5%	1/6W
R323	1-247-863-00	CARBON	22K	5%	1/6W
R324	1-247-847-00	CARBON	4.7K	5%	1/6W
R325	1-247-847-00	CARBON	4.7K	5%	1/6W
R327	1-247-863-00	CARBON	22K	5%	1/6W
R328	1-247-863-00	CARBON	22K	5%	1/6W
R329	1-247-863-00	CARBON	22K	5%	1/6W
R330	1-247-863-00	CARBON	22K	5%	1/6W
R331	1-247-811-00	CARBON	150	5%	1/6W
R332	1-247-819-00	CARBON	330	5%	1/6W
R333	1-247-819-00	CARBON	330	5%	1/6W
R334	1-247-863-00	CARBON	22K	5%	1/6W
R335	1-247-853-00	CARBON	8.2K	5%	1/6W
R336	1-247-853-00	CARBON	8.2K	5%	1/6W
R337	1-247-879-00	CARBON	100K	5%	1/6W
R338	1-247-903-00	CARBON	1M	5%	1/6W
R339	1-247-903-00	CARBON	1M	5%	1/6W
R340	1-247-855-00	CARBON	10K	5%	1/6W
R341	1-247-847-00	CARBON	4.7K	5%	1/6W
R342	1-247-807-00	CARBON	100	5%	1/6W
R343	1-247-887-00	CARBON	220K	5%	1/6W
R344	1-247-863-00	CARBON	22K	5%	1/6W
R345	1-247-863-00	CARBON	22K	5%	1/6W
R348	1-247-863-00	CARBON	22K	5%	1/6W
R349	1-247-863-00	CARBON	22K	5%	1/6W
R350	1-247-863-00	CARBON	22K	5%	1/6W
R351	1-247-863-00	CARBON	22K	5%	1/6W
R352	1-247-863-00	CARBON	22K	5%	1/6W
R353	1-247-863-00	CARBON	22K	5%	1/6W
R354	1-247-863-00	CARBON	22K	5%	1/6W

ELECTRICAL PARTS

Ref.No.	Part No.	Description			
R355	1-247-863-00	CARBON	22K	5%	1/6W
R356	1-247-839-00	CARBON	2.2K	5%	1/6W
R357	1-247-887-00	CARBON	220K	5%	1/6W
R358	1-247-863-00	CARBON	22K	5%	1/6W
R359	1-247-855-00	CARBON	10K	5%	1/6W
R360	1-247-861-00	CARBON	18K	5%	1/6W
R361	1-247-885-00	CARBON	180K	5%	1/6W
R362	1-247-861-00	CARBON	18K	5%	1/6W
R363	1-247-863-00	CARBON	22K	5%	1/6W
R364	1-247-863-00	CARBON	22K	5%	1/6W
R365	1-247-863-00	CARBON	22K	5%	1/6W
R366	1-247-855-00	CARBON	10K	5%	1/6W
R367	1-247-879-00	CARBON	100K	5%	1/6W
R368	1-247-815-00	CARBON	220	5%	1/6W
R401	1-247-855-00	CARBON	10K	5%	1/6W
R402	1-247-851-00	CARBON	6.8K	5%	1/6W
R403	1-247-863-00	CARBON	22K	5%	1/6W
R404	1-247-855-00	CARBON	10K	5%	1/6W
R405	1-247-855-00	CARBON	10K	5%	1/6W
R406	1-247-875-00	CARBON	68K	5%	1/6W
R407	1-214-779-00	METAL	120K	1%	1/4W
R408	1-247-877-00	CARBON	82K	5%	1/6W
R409	1-247-859-00	CARBON	15K	5%	1/6W
R410	1-247-871-00	CARBON	47K	5%	1/6W
R411	1-247-855-00	CARBON	10K	5%	1/6W
R412	1-247-855-00	CARBON	10K	5%	1/6W
R413	1-247-859-00	CARBON	15K	5%	1/6W
R414	1-247-859-00	CARBON	15K	5%	1/6W
R415	1-247-869-00	CARBON	39K	5%	1/6W
R416	1-247-869-00	CARBON	39K	5%	1/6W
R417	1-247-855-00	CARBON	10K	5%	1/6W
R418	1-244-845-00	CARBON	68	5%	1/2W
R419	1-247-855-00	CARBON	10K	5%	1/6W
R420	1-247-845-00	CARBON	3.9K	5%	1/6W
R421	1-247-847-00	CARBON	4.7K	5%	1/6W
R422	1-247-879-00	CARBON	100K	5%	1/6W
R423	1-214-729-00	METAL	1K	1%	1/4W
R424	1-214-758-00	METAL	16K	1%	1/4W
R425	1-247-895-00	CARBON	470K	5%	1/6W
R426	1-247-855-00	CARBON	10K	5%	1/6W
R427	1-247-867-00	CARBON	33K	5%	1/6W
R428	1-247-835-00	CARBON	1.5K	5%	1/6W
R429	1-247-839-00	CARBON	2.2K	5%	1/6W
R430	1-247-855-00	CARBON	10K	5%	1/6W
R431	1-247-831-00	CARBON	1K	5%	1/6W

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- MMH : mH, UH : μH

SEMICONDUCTORS
In each case, U : μ, for example:
UA···: μA···, UPA···: μPA···, UPC···: μPC,
UPD···: μPD···

ELECTRICAL PARTS

Ref.No.	Part No.	Description			
R432	1-247-831-00	CARBON	1K	5%	1/6W
R433	1-247-873-00	CARBON	56K	5%	1/6W
R434	1-247-855-00	CARBON	10K	5%	1/6W
R435	1-247-863-00	CARBON	22K	5%	1/6W
R436	1-247-855-00	CARBON	10K	5%	1/6W
R437	1-247-867-00	CARBON	33K	5%	1/6W
R438	1-247-879-00	CARBON	100K	5%	1/6W
R439	1-247-861-00	CARBON	18K	5%	1/6W
R440	1-247-865-00	CARBON	27K	5%	1/6W
R441	1-247-855-00	CARBON	10K	5%	1/6W
R442	1-247-813-00	CARBON	180	5%	1/6W
R443	1-247-877-00	CARBON	82K	5%	1/6W
R444	1-247-855-00	CARBON	10K	5%	1/6W
R445	1-247-855-00	CARBON	10K	5%	1/6W
R446	1-247-855-00	CARBON	10K	5%	1/6W
R447	1-247-823-00	CARBON	470	5%	1/6W
R448	1-247-855-00	CARBON	10K	5%	1/6W
R449	1-247-883-00	CARBON	150K	5%	1/6W
R450	1-247-871-00	CARBON	47K	5%	1/6W
R451	1-247-871-00	CARBON	47K	5%	1/6W
R452	1-247-876-00	CARBON	75K	5%	1/6W
R453	1-247-876-00	CARBON	75K	5%	1/6W
R454	1-247-871-00	CARBON	47K	5%	1/6W
R455	1-247-871-00	CARBON	47K	5%	1/6W
R456	1-247-881-00	CARBON	120K	5%	1/6W
R457	1-247-847-00	CARBON	4.7K	5%	1/6W
R458	1-247-863-00	CARBON	22K	5%	1/6W
R459	1-247-879-00	CARBON	100K	5%	1/6W
R460	1-247-877-00	CARBON	82K	5%	1/6W
R461	1-247-855-00	CARBON	10K	5%	1/6W
R462	1-247-855-00	CARBON	10K	5%	1/6W
R463	1-247-855-00	CARBON	10K	5%	1/6W
R464	1-247-835-00	CARBON	1.5K	5%	1/6W
R465	1-247-863-00	CARBON	22K	5%	1/6W
R466	1-247-855-00	CARBON	10K	5%	1/6W
R467	1-247-841-00	CARBON	2.7K	5%	1/6W
R468	1-247-863-00	CARBON	22K	5%	1/6W
R469	1-247-875-00	CARBON	68K	5%	1/6W
R470	1-247-855-00	CARBON	10K	5%	1/6W
R471	1-247-843-00	CARBON	3.3K	5%	1/6W
R472	1-247-843-00	CARBON	3.3K	5%	1/6W
R473	1-247-903-00	CARBON	1M	5%	1/6W
R474	1-247-855-00	CARBON	10K	5%	1/6W
R475	1-247-855-00	CARBON	10K	5%	1/6W
R476	1-247-863-00	CARBON	22K	5%	1/6W

ELECTRICAL PARTS

Ref.No.	Part No.	Description			
R477	1-247-863-00	CARBON	22K	5%	1/6W
R478	1-247-863-00	CARBON	22K	5%	1/6W
R479	1-247-863-00	CARBON	22K	5%	1/6W
R480	1-247-877-00	CARBON	82K	5%	1/6W
R481	1-247-847-00	CARBON	4.7K	5%	1/6W
R482	1-247-852-00	CARBON	7.5K	5%	1/6W
R483	1-247-855-00	CARBON	10K	5%	1/6W
R484	1-247-872-00	CARBON	51K	5%	1/6W
R485	1-247-847-00	CARBON	4.7K	5%	1/6W
R486	1-247-855-00	CARBON	10K	5%	1/6W
R487	1-247-839-00	CARBON	2.2K	5%	1/6W
R488	1-247-873-00	CARBON	56K	5%	1/6W
R489	1-247-882-00	CARBON	130K	5%	1/6W
R490	1-247-882-00	CARBON	130K	5%	1/6W
R491	1-247-879-00	CARBON	100K	5%	1/6W
R492	1-247-879-00	CARBON	100K	5%	1/6W
R493	1-247-859-00	CARBON	15K	5%	1/6W
R494	1-247-862-00	CARBON	20K	5%	1/6W
R495	1-247-862-00	CARBON	20K	5%	1/6W
R496	1-247-855-00	CARBON	10K	5%	1/6W
R497	1-246-401-00	CARBON	1	5%	1/4W
R498	1-246-401-00	CARBON	1	5%	1/4W
R501	1-247-855-00	CARBON	10K	5%	1/6W
R502	1-247-863-00	CARBON	22K	5%	1/6W
R503	1-247-847-00	CARBON	4.7K	5%	1/6W
R504	1-247-847-00	CARBON	4.7K	5%	1/6W
R505	1-247-807-00	CARBON	100	5%	1/6W
R506	1-214-739-00	METAL	2.7K	1%	1/4W
R507	1-214-771-00	METAL	56K	1%	1/4W
R508	1-247-847-00	CARBON	4.7K	5%	1/6W
R509	1-247-847-00	CARBON	4.7K	5%	1/6W
R510	1-214-757-00	METAL	15K	1%	1/4W
R511	1-214-763-00	METAL	27K	1%	1/4W
R512	1-214-754-00	METAL	11K	1%	1/4W
R513	1-214-757-00	METAL	15K	1%	1/4W
R514	1-214-763-00	METAL	27K	1%	1/4W
R515	1-214-754-00	METAL	11K	1%	1/4W
R516	1-214-757-00	METAL	15K	1%	1/4W
R517	1-214-758-00	METAL	16K	1%	1/4W
R522	1-214-745-00	METAL	4.7K	1%	1/4W
R523	1-214-717-00	METAL	330	1%	1/4W
R524	1-214-956-00	METAL	470K	1%	1/4W
R525	1-214-735-00	METAL	1.8K	1%	1/4W
R526	1-214-745-00	METAL	4.7K	1%	1/4W
R527	1-214-717-00	METAL	330	1%	1/4W

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CAPACITORS:
MF:μF, PF:μμF.

RESISTORS
- All resistors are in ohms.
- F : nonflammable

COILS
- MMH : mH, UH : μH

SEMICONDUCTORS
In each case, U : μ, for example:
UA···: μA···, UPA···: μPA···, UPC···: μPC,
UPD···: μPD···

ELECTRICAL PARTS

Ref.No.	Part No.	Description			
R528	1-214-956-00	METAL	470K	1%	1/4W
R529	1-214-735-00	METAL	1.8K	1%	1/4W
R530	1-214-777-00	METAL	100K	1%	1/4W
R531	1-214-777-00	METAL	100K	1%	1/4W
R532	1-214-713-00	METAL	220	1%	1/4W
R533	1-214-713-00	METAL	220	1%	1/4W
R534	1-214-713-00	METAL	220	1%	1/4W
R535	1-214-713-00	METAL	220	1%	1/4W
R536	1-214-761-00	METAL	22K	1%	1/4W
R537	1-214-761-00	METAL	22K	1%	1/4W
R538	1-214-745-00	METAL	4.7K	1%	1/4W
R539	1-214-765-00	METAL	33K	1%	1/4W
R540	1-214-745-00	METAL	4.7K	1%	1/4W
R541	1-214-713-00	METAL	220	1%	1/4W
R542	1-214-745-00	METAL	4.7K	1%	1/4W
R543	1-214-765-00	METAL	33K	1%	1/4W
R544	1-214-745-00	METAL	4.7K	1%	1/4W
R545	1-214-713-00	METAL	220	1%	1/4W
R603	1-247-099-00	CARBON	47	5%	1/4W
R604	1-247-099-00	CARBON	47	5%	1/4W
R605	1-214-737-00	METAL	2.2K	1%	1/4W
R606	1-214-753-00	METAL	10K	1%	1/4W
R607	1-214-752-00	METAL	9.1K	1%	1/4W
R608	1-214-732-00	METAL	1.3K	1%	1/4W
R609	1-214-743-00	METAL	3.9K	1%	1/4W
R610	1-214-730-00	METAL	1.1K	1%	1/4W
R611	1-214-737-00	METAL	2.2K	1%	1/4W
R612	1-214-759-00	METAL	18K	1%	1/4W
R614	1-247-839-00	CARBON	2.2K	5%	1/6W
R615	1-247-831-00	CARBON	1K	5%	1/6W
R616	1-247-851-00	CARBON	6.8K	5%	1/6W
R617	1-247-839-00	CARBON	2.2K	5%	1/6W
R618	1-247-855-00	CARBON	10K	5%	1/6W
R619	1-247-855-00	CARBON	10K	5%	1/6W
R620	1-247-885-00	CARBON	180K	5%	1/6W
R621	1-247-807-00	CARBON	100	5%	1/6W
R901	1-246-466-00	CARBON	510	5%	1/4W
R902	1-246-466-00	CARBON	510	5%	1/4W
R903	⚠.1-214-937-00	(AEP)...METAL	1M	1%	1/2W

ELECTRICAL PARTS

Ref.No.	Part No.	Description
RV101	1-224-256-XX	RES, ADJ, METAL GLAZE 220K
RV102	1-224-253-XX	RES, ADJ, METAL GLAZE 22K
RV103	1-224-252-XX	RES, ADJ, METAL GLAZE 10K
RV104	1-224-253-XX	RES, ADJ, METAL GLAZE 22K
RV301	1-226-241-00	RES, ADJ, CARBON 500K
RV401	1-224-255-XX	RES, ADJ, METAL GLAZE 100K
RV402	1-224-252-XX	RES, ADJ, METAL GLAZE 10K
RV403	1-226-236-00	RES, ADJ, CARBON 10K
RV404	1-226-236-00	RES, ADJ, CARBON 10K
RY501	1-515-473-00	RELAY
RY502	1-515-473-00	RELAY
S701	1-553-856-00	SWITCH, KEY BOARD (PLAY)
S702	1-553-856-00	SWITCH, KEY BOARD (PAUSE)
S703	1-553-856-00	SWITCH, KEY BOARD (⏮)
S704	1-553-856-00	SWITCH, KEY BOARD (⏭)
S705	1-553-856-00	SWITCH, KEY BOARD (INDEX)
S706	1-553-856-00	SWITCH, KEY BOARD (◀◀)
S707	1-553-856-00	SWITCH, KEY BOARD (▶▶)
S708	1-553-856-00	SWITCH, KEY BOARD (INDEX)
S709	1-553-856-00	SWITCH, KEY BOARD (REPEAT ALL)
S710	1-553-856-00	SWITCH, KEY BOARD (REPEAT A-B)
S711	1-553-856-00	SWITCH, KEY BOARD (CLEAR)
S712	1-553-856-00	SWITCH, KEY BOARD (ELAPSED/REMAINING)
S713	1-553-856-00	SWITCH, KEY BOARD (STOP)
S714	1-553-856-00	SWITCH, KEY BOARD (OPEN/CLOSE)
S801	1-553-636-00	SWITCH, MICRO (MOTOR SELECT)
S802	1-553-636-00	SWITCH, MICRO (CHUCKING MOTOR)
S803	1-554-205-00	SWITCH, PUSH (LOADING OUT)
S804	⚠.1-554-205-00	SWITCH, PUSH (LASER ON)
S805	1-554-205-00	SWITCH, PUSH (LOADING IN)
S806	⚠.1-554-205-00	SWITCH, PUSH (LASER ON)
S807	1-554-205-00	SWITCH, PUSH (LIMIT IN)
S901	⚠.1-553-318-00	(AEP,E)...SWITCH, PUSH (AC POWER)
S901	⚠.1-553-447-00	(UK).....SWITCH, PUSH (AC POWER)
T201	1-407-568-00	COIL, VARIABLE 6.8UH
T501	1-426-090-00	TRANSFORMER, RF
T901	⚠.1-447-742-11	(E).......TRANSFORMER, POWER
T901	⚠.1-447-743-00	(AEP,UK)...TRANSFORMER, POWER
VR901	1-226-980-00	RES, VAR, CARBON 20K/20K (HEADPHONES LEVEL)
X301	1-567-143-00	VIBRATOR, CERAMIC
X501	1-527-999-00	OSCILLATOR, CRYSTAL
X502	1-527-948-00	VIBRATOR, CRYSTAL

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The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Sony Corporation

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